Pit and Quarry

Published Every Other Wednesday for Producers and Manufacturers of Sand, Gravel, Stone, Cement, Gypsum, Lime and Other Non-Metallic Minerals.

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V. E. LARSEN, Vice-President
S. E. COLE, Eastern Representative
1235 Watchung Place
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Pit and Quarry

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"OVER-STANDARDIZATION" VS. "OVER-DIVERSIFICATION"

By Ray M. Hudson

SALES managers and plant managers may differ in their views on many points, but they have at least one point in common. Both want "Volume!" However, the plant manager usually looks to standardization of product, processes, and equipment as the basis of quantity production and low unit cost of manufacturing. The sales manager usually looks to diversification in the product as the basis of volume sales. He favors changes in sizes, color, or finish, also novelty in the product, as necessary aids to greater volume. While low prices, resulting from low production cost, is also a talking point, the sales manager sometimes brushes this aside, saying, "The public will pay the price if the product is right," i.e., if it is what the public wants.

Sales managers fear "over-standardization"; they realize products, however satisfactory from the standpoint of utility, may lose their appeal. The public is always watching for something new, for better quality, better value, better service; so the sales manager encourages constant refinement and improvement of the product—even fundamental changes in the product itself, if necessary—to keep it in step with the consumer's advancing requirements.

Plant managers fear "over-diversification." Too many varieties, too many changes in sizes, etc., interfere with maximum economy in manufacturing. Purchasing problems are complicated, stocks multiply, inventories increase; smaller quantities of each kind of goods going through the plant mean shorter runs, more changes of machine "set-ups," more clerical work, and higher operating costs.

Simplification offers an excellent basis of compromise between the "factory" and the "sales" viewpoints. It affords an opportunity to reduce variety to the point where it permits fair economy in production, and yet retain sufficient variety to satisfy the bulk of consumer demand. It strikes the balance between "no change" and "too much change" in product sizes or quality.

Some of the most successful companies today are those which through simplification have found it possible to produce and sell the volume that means growth, profit and prosperity for them and still avoid the excessive variety that causes slow turnover, excessive inventory, and avoidable waste. Manufacturers and merchants who keep their lines condensed to the variety represented in this compromise are better able to meet sudden shifts in the consumers' dictates. They have less to discard, less inventory to write off, fewer goods to throw on the bargain counter, or to try to move by clearance sales.

Simplification is the "happy medium" between over-standardization and over-diversification—between standardization which stultifies demand and loses sales, and excessive variety which runs up manufacturing and selling costs, eats into profits, and causes waste.

CAPITAL REQUIREMENTS OF SMALL BUSINESS

LA SALLE Extension University published in its Business Bulletin for July some pertinent paragraphs under the heading, "Capital Requirements of Small Business." The subject is of interest to many Pit and Quarry readers, so we publish the article in full here:

"The recent stiffening in money rates, in defiance of the usual seasonal precedent, calls attention to a rather remarkable factor in current business financing—a factor that has been almost entirely overlooked.

"It has been frequently said that stock-market operations have caused the abnormally high interest rates for this time of year; it has also been asserted that plenty of loanable funds are available for business operations. Both of these statements are undoubtedly true. However, the effect of high interest rates on the current operations of individual companies varies rather sharply. While no sharp line of demarcation can be drawn, it is becoming clearly apparent that the large, well-financed concerns are at present reaping another advantage over their smaller competitors.

"This advantage is important, although it is entirely a financial one. It is not generally realized how many large concerns have actual cash surpluses in excess of their current financial requirements. Not only do these companies not

need to borrow from banks, but they even have money to lend. For example, a cursory survey of the financial statements of a large number of firms whose stocks are prominent among the market favorites discloses unusually favorable ratios of current assets to current liabilities, and in any number of cases an excess of cash marketable securities over current liabilities.

"This can mean but one thing: That the larger, well-financed companies are in a position to show increased earnings from nonoperating items, and that most of the smaller firms are having to pay out more for current interest charges. Such a situation serves to increase the competitive burdens already so heavy for small enterprises."

GOOD ROADS INCREASE LIFE OF MOTOR VEHICLES

THE average life of motor vehicles in the United States has been increased 14 per cent, largely as a result of good roads, the American Road Builders' Association pointed out recently.

A total of 1,825,581 vehicles were sent to the scrap heap during 1927, the association states. This was 12.05 per cent of the total registration at the beginning of the year, indicating that should this average maintain, the entire stock of motor cars would be replaced every eight and one-fourth years. The average life of a motor vehicle was formerly estimated at 7 years.

New York lead all states in the number of cars scrapped, that state discarding 149,372 vehicles. Nevada discarded only 813 vehicles, the smallest number of all states. Arkansas held the highest junkage rate, that state discarding 16.6 per cent of all vehicles registered at the beginning of the year. South Carolina discarded only 2.8 per cent of the cars registered.

All but two states registered more vehicles in 1927 than in 1926. They were Florida and Arkansas, the former decreasing by 6,828 cars and the latter by 2,851. North Carolina recorded the largest comparative increase, that state gaining 11.8 per cent over 1926. National registration was increased 5.1 per cent.

Most of the scrapped vehicles were partially salvaged, the American Road Builders' Association says. Metal parts were in many cases adapted to vehicles still in use, while a large number of motors were installed in boats or used as stationary power plants. The bodies were burned or cast into dump heaps. One New York salvaging agency maintains a seven acre plot of ground for storing undamaged parts of disassembled vehicles.

In tabulating the figures pertaining to the discard of motor vehicles, the American Road Builders' Association has considered all cars scrapped which were registered in 1926 but not re-registered during 1927. Some of these cars, however, may have been registered in other states, making the figures for each individual state slightly in error, although the national figure would be reasonably accurate.

The following columns show in turn the number of vehicles scrapped, the number of new cars registered, and the percentage of registration increase in each state during 1927:

State	Cars Scrapped	New Cars	Percentage of Increased Registration
Alabama	23,329	40,938	7.8
Arizona	3,439	10,804	10.0
Arkansas	34,996	32,145	—1.4
California	93,748	186,468	5.8
Colorado	12,253	32,132	8.0
Connecticut	29,140	47,426	6.9
Delaware	4,823	7,113	5.1
District of Columbia	17,533	17,605	0.2
Florida	43,618	36,790	—1.7
Georgia	17,533	40,700	8.4
Idaho	7,294	13,870	6.9
Illinois	97,522	166,004	5.0
Indiana	57,077	98,388	5.3
Iowa	69,087	74,292	0.7
Kansas	44,115	54,740	2.2
Kentucky	31,504	35,568	1.4
Louisiana	10,890	26,390	6.5
Maine	9,171	21,308	8.0
Maryland	19,271	37,354	7.1
Massachusetts	94,301	98,218	0.6
Michigan	119,796	155,784	3.2
Minnesota	50,360	66,757	2.6
Mississippi	16,311	29,154	6.2
Missouri	67,784	95,649	4.2
Montana	9,412	18,189	8.4
Nebraska	36,845	43,984	1.9
Nevada	863	2,625	7.3
New Hampshire	4,776	11,784	7.9
New Jersey	47,656	108,546	9.4
New Mexico	2,865	7,160	7.8
New York	149,372	271,856	5.7
North Carolina	21,765	67,217	11.8
North Dakota	13,956	16,835	1.8
Ohio	80,939	171,427	6.1
Oklahoma	69,366	72,554	0.6
Oregon	16,537	27,541	4.7
Pennsylvania	135,378	235,109	6.9
Rhode Island	9,646	16,914	6.6
South Carolina	5,039	23,485	10.2
South Dakota	18,236	19,558	0.8
Tennessee	18,884	33,812	5.3
Texas	75,306	136,844	5.9
Utah	2,889	11,485	10.1
Vermont	4,390	9,854	7.4
Virginia	33,209	48,202	4.6
Washington	18,626	39,930	5.9
West Virginia	17,209	35,192	7.9
Wisconsin	52,543	88,550	5.4
Wyoming	5,181	7,253	4.2
Totals	1,825,581	2,623,538	Ave. 5.17

MEN OF THE INDUSTRY

The portraits printed on this page in each number of PIT and QUARRY are taken from our files and their selection is without significance as to current events or as to the position of the individual in the industry.

J. F. Haggerty

Mr. Haggerty Is President and Treasurer of the National Gypsum Company, Buffalo, N. Y.

NON METALLIC MINERAL RESOURCES STUDIED FOR WHITE RIVER VALLEY IN ARKANSAS

By W. M. Weigel

THE southeastern edge of the Ozark Uplift in Northern Arkansas is approximately along a line drawn through Poplar Bluff, Missouri and Little Rock, Arkansas. Southeastward of this line are the flat lands of the Coastal plain while northwestward the hills rise rather abruptly with a gradual increase in elevation to the northwest.

White River, the largest stream in Northern Arkansas, enters the state at a point south of Springfield, Missouri and flowing southeastward emerges from its valley through the Ozarks at Batesville, the eastern gateway to the White River Country. The valley proper is comparatively narrow so that the river, in cutting down through the high land to the floor, has exposed the rock formations for a considerable vertical height, making prospecting throughout the range exposed an easy matter. Also development of mineral resources below the upper surface of the uplift is greatly facilitated along the steep slopes and bluffs of the river.

The general dip of all the formations is to the southeast. This is regional, however, and many local rolls or folds and small faults may cause the strata to dip in any direction in the immediate vicinity of the disturbance. The younger rocks outcrop along the southeastern edge while the older formations come successively to the surface as we pass to the northwest. The rocks of the area are all of sedimentary origin and consist of dolomite, magnesian limestone, limestone, sandstone, shale and chert. They have undergone little change except consolidation since their deposition, and are unmetamorphosed. Some of the limestones are highly crystalline, forming commercial marbles, but this change is probably due to chemical action alone, and not physical disturbances.

In age, the rocks exposed vary from the Mississippian of the Carboniferous to lower Ordovician.

Miser[1] has discussed the geology of part of the southeastern end of the valley in the Batesville district and gives the generalized geological section shown in Figure 1.

Figure 2 is a generalized section by Purdue and Miser[2] of rocks exposed in the northern part of the White River Valley. The youngest formation with any exposed area of consequence is the Batesville Sandstone. Formations above this only occur as a few small areas on the tops of the highest hills.

[1]Miser, Hugh D. Deposits of Manganese Ore in the Batesville District, Arkansas. U. S. Geol. Sur. Bul. 734, 1922.

[2]Purdue, A. H., and Miser, H. D. U. S. Geol. Sur. Eureka Springs-Harrison Folio No. 202, 1916.

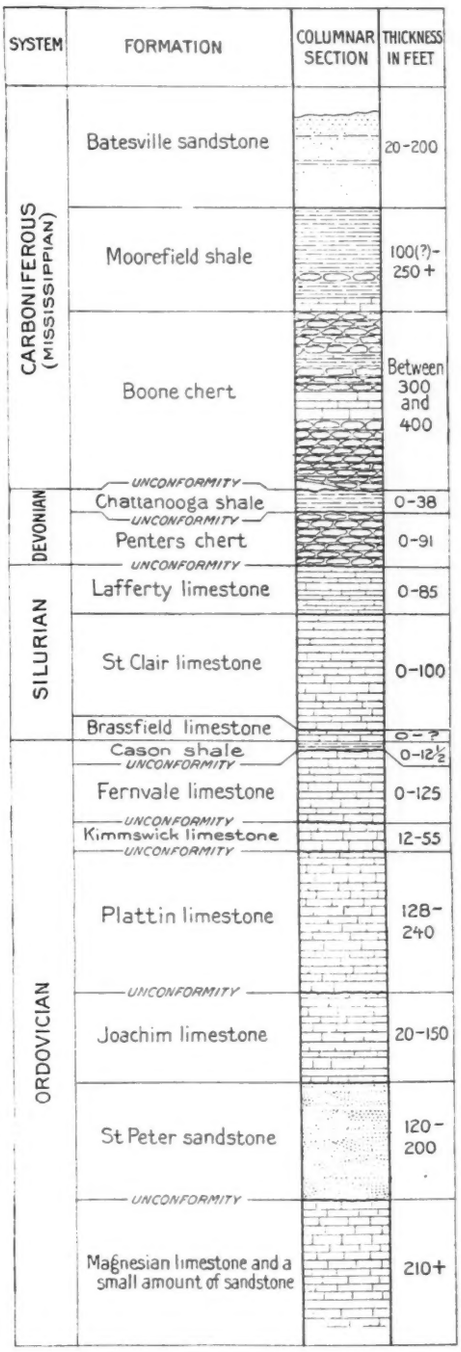


Figure 1.—Composite Section of all Rocks Exposed In the Batesville District

By comparing the sections it will be noted that the authors consider the Silurian as absent in the northwestern part of the valley. The Moorefield shale is also lacking. There are also some differences in formations, or difference in names of formations occurring between the Fernvale limestone and St. Peter Sandstone of the Ordovician.

General Conditions

Until recent years there has been but little development of the non-metallic resources on account of lack of adequate transportation and distance from markets, as most non-metallics are comparatively cheap commodities requiring rail transportation to markets within reasonable distances. These two main obstacles have been largely overcome. Rail transportation is available over the White River Division of the Missouri Pacific Railroad which follows the river for almost its entire distance in the Arkansas Ozarks and the gradual tendency of manufacturing plants consuming the various commodities to locate in the lower Mississippi Valley and the Southwest is creating a rapidly growing market.

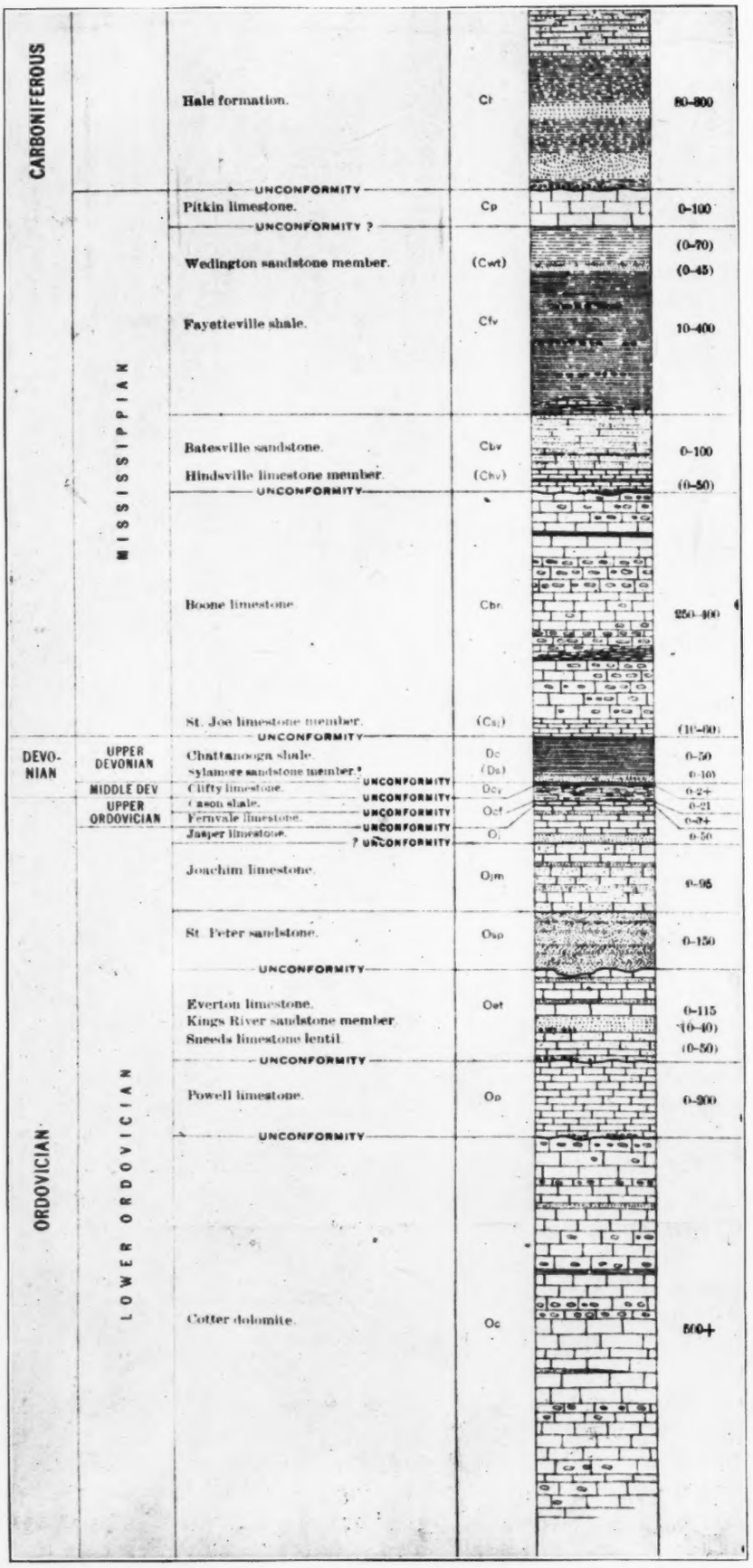


Figure 2.—Composite Section of All Rocks In the Western End of White River Valley In Arkansas

Arkansas now has under way a comprehensive road building program which will give highway facilities in the way of well located concrete and gravel surfaced roads over much of the White River Country. Not only will this open up development possibilities, but it will also make a market for aggregate, both coarse and fine, cement and road surfacing material.

In the past, wood has been mainly used as a source of fuel, but the district is not far from the coal fields of southern Illinois and of western Arkansas. Oil from Arkansas, Louisiana and Oklahoma is being used for Diesel engine drive in a number of cases.

At present the Batesville district is supplied with electric power from the transmission lines of the Arkansas Light and Power Co. Hydro-electric power sites of the company have been surveyed near Cotter on the White River, on the north fork of White River and on Crooked Creek. A total of about 170,000 horse power is available for development which is expected to take place in the near future. Cheap, readily available electric power will broaden the economic possibilities of development of many of the mineral and stone resources besides affording desirable locations for plants for which a source of raw mineral products is essential. The supplying of St. Louis with natural gas from the Louisiana fields now seems possible and while the location of the pipe lines has not been

fixed, they should pass not far from the eastern end of the valley. These different phases of the general industrial features and possibilities of the district make a decidedly more favorable picture than existed a few years ago.

Practically all types of stone of sedimentary origin are available from high grade marbles to soft sandstone.

Marble and Limestone

Most of the marble occurs in the Boone formation of the Mississippian and the St. Clair of the Silurian. The Boone limestone has an estimated thickness varying from 250 to 400 feet. It extends throughout the entire area and consists of limestone, cherty limestone and chert, which sometimes vary quite rapidly both horizontally and vertically. In general, however, the limestone is found at the top, the middle and the base. At the base of the formation is the St. Joe member, which forms one of the principal beds of marble in some localities. Over much of the area exposed the Boone is too cherty to be of value as marble, building stone, or as a source of lime. In certain localities, however, it is of extreme purity. It is then a fine grained buff gray or light gray to almost white crystalline rock, sometimes semi-oolitic and some beds capable of taking a high polish, so that it gives a pleasing, soft toned effect when used for interiors. It has been worked for some years at Pfeiffer, near Batesville by the Batesville Marble Quarries Company.

Figure 3 which shows Quarry "B" of this company, gives an idea of the thickness of the beds and size of quarry blocks obtained. It is possible to secure blocks ten feet thick without a seam. The quarry is equipped with three steam driven channelers, three derricks and the necessary hoists and accessories. This quarry is connected by standard gauge track with the sawing and finishing plant at Quarry A., Figure 4. Here there are six gang saws, a diamond cut off saw, four planers, two lathes and polishing machines. Some of the marble is shipped as rough quarry blocks. A good part is sawed to dimensions and shipped for exterior building stone, monumental work and similar uses, and part shipped as sawed slabs ready for polishing and finishing. Only a small part is finished at the plant. The State Capital at Little Rock is built of this stone, also some of the buildings of the Uni-

Figure 3

versity of Arkansas at Fayetteville. It was also used in the construction of the Federal Penitentiary at Leavenworth, Kansas. Some of the other large buildings in which it has been used are: Little Rock Public Library, Masonic Temple of Little Rock, and Christian Science Church, St. Joseph, Missouri. Mr. John P. Cargill is General Manager. The Batesville Marble Quarries Company market their product under the name of "Batesville Buff Gray Marble."

Hopkins[3] gives the following chemical analysis of a sample of limestone from the Boone formation from a location just north of Batesville:

	Per cent
Lime	55.17
Magnesia	Trace
Silica	1.61
Alumina	0.00
Iron Oxide	0.14
Potash	0.14
Soda	0.09
Phosphoric Acid	0.10
Loss on ignition	43.13
	100.38
Carbonate of Lime	98.29

[3]Hopkins, T. C. Annual Rep. Geol. Sur. of Ark., 1890, Vol. IV, page 98.

The Independence County Marble Company of Batesville is operating a quarry in the Boone limestone about seven miles northwest of Batesville. The quarry plant is equipped with two gang saws. Most of the stone is used for monument and memorial work and is shipped as quarry blocks and sawed dimension stock. The Batesville Marble and Granite Company at Batesville take part of the output. Their product is largely finished monuments. The marble is of a uniform fine grained texture, light gray in color and very similar to that at Pfeiffer although a little harder. Power for the quarry plant is supplied by a Diesel engine.

Mr. John Seery is President of the Independence County Marble Company. Mr. V. V. Bates and B. M. Dawson are proprietors of the Batesville Marble and Granite Company, and Mr. Bates is also manager of the Independence County Marble Company.

At Cartney, Baxter County, in the northwest part of the valley the White River Marble Company has opened a quarry in the Boone limestone and the underlying St. Joe member of the Boone formation. The Boone is here a coarser grained marble than from the quarries near Batesville. In color it is gray, with yellow markings and is marketed as "Golden Vein Gray." The St. Joe furnishes a

Figure 4

marble with a dark red matrix or background in which are numerous white fossil casts, giving an ornamental stone of very pleasing appearance. It is marked as "Red Arkansas Fossil." The quarry is at a considerable elevation above the railroad so the quarry blocks are lowered on a steep incline down the mountain side. Most of the output is shipped in the rough to a finishing plant in Little Rock, and other marble contractors. There is one gang saw at the railroad where a small amount of dimension stone is produced. Mr. John M. Hawkins is President, and Mr. H. F. Wolford is Superintendent.

The St. Joe member of the Boone formation is one of the best sources of marble in the White River Valley. It is very persistent over all the northwestern part of the area, but is not found in the southeastern part toward Batesville. Miser[4] believes a few feet of brown crinoidal limestone noted at the base of the Boone in some localities in the Batesville District to be the St. Joe, but the stone is of no possible commercial value in this locality.

Toward the west the St. Joe is 10 to 60 feet thick. The upper part is usually a coarsely crystalline gray rock. The central part is inclined to be shaley and the lower part crystalline, sometimes fine grained and varying in color from pink through red to chocolate brown. White crinoid casts of calcite are usually prolific throughout the member. Only at certain localities can it be classed as a marble. At most of the occurrences it is too soft, too thinly bedded, unsound or of poor color. Probably the best outcrops are in Baxter County in the vicinity of the junction of the valleys of the North Fork and Crooked Creek with White River Valley[5].

The St. Joe limestone is a high calcium rock and if it has the proper physical properties for successful burning would be suitable for the manufacture of high calcium lime; especially the upper part of the member which is usually gray and lower in iron oxide than the lower beds. Hopkins[6] gives the following analysis of a mottled chocolate and gray colored variety of the St. Joe from the same ledge from which the block was taken for the Washington Monument.

Mr. H. F. Wolford of Cartney, Arkansas, is preparing to open a marble quarry on the Missouri Pacific Railroad, about half way between Williamson and Guion. The beds to be worked are probably in the Plattin limestone. This forms the upper part of the formation called the "Izard" in the early Arkansas reports. The rock is very fine textured and varies from a light gray to dark gray with golden veins.

Other developments of marble deposits are con-

[4]Miser, H. D. U. S. Geol. Sur. Bul. 734, 1922, page 37.

[5]Hopkins, T. C. Annual Rep. Geol. Sur. of Ark., 1890, Vol. IV, page 271.

Figure 5

templated. Polished samples from some of these are beautifully figured in shades of red, brown, gray, white and yellow.

	Per cent
Residue Insol. in Hydrochloric Acid	0.800
Titanic Oxide	Trace
Phosphoric Acid	0.023
Alumina	0.009
Ferric Oxide	0.051
Manganese Oxide	0.015
Zinc Oxide, present but not determined	——
Potash and Soda	0.054
Magnesia	0.190
Lime	55.390
Loss on ignition	43.740
	100.272
Carbonate of Lime	98.91

Sandstone

Sandstone has rather fallen into a state of disuse for building purposes in recent years but just now there seems to be a tendency to utilize it more than in the immediate past, especially when suitable stone can be secured within reasonable distance and at proper cost. Good sandstone is one of the most weather resisting natural building materials and when it is of such character that it can be easily worked often makes an ideal material.

The Batesville sandstone formation, so named from its strong occurrence near Batesville, is part of the Mississippian and lies above the Boone chert from which it is separated by the Moorefield shale. It forms the surface of most of the hills, ridges and higher land in the Batesville District. It is a fine grained sandstone, cemented with iron oxide and some carbonate of lime. The color varies from brown through buff to cream. It splits easily along the bedding planes in slabs varying from a few inches to 3 or 4 feet in thickness. When green it works easily and has been largely used locally in the construction of buildings of the better type. When seasoned it becomes quite hard. The thickness of the formation is quite variable, from 20 or 30 feet to as much as 300 feet. There are many locations near Batesville where it forms the upper portions of hills ideally situated for quarrying. The First Baptist Church at Batesville, Figure 5, is built of this stone and illustrates the

Figure 6

soft pleasing appearance that can be secured. The soft brown and buff shades give an effect of age, but old buildings in which the stone has been used illustrate its durability, as the rough corners and tool marks still stand out clear and sharp.

Given proper architectural treatment, it makes a desirable stone especially for fine residences, churches, libraries and similar structures, and it can be cheaply produced by native labor. Most of the other sandstone beds of the White River District are friable, as the St. Peter, or else too thin or irregular to be of value.

Crushed Stone

There are no crushed stone plants at present in the White River District. This is due to previous lack of markets. This condition is rapidly changing, however, as the State Highway program calls for some concrete pavements in this section, and the development of hydro-electric power on White River will bring various industries requiring concrete foundations and buildings and an expansion of construction work of all kinds. Beside pavements, highway bridges over White River will be built in the near future, and the need of stone aggregate in culverts, bridges and retaining walls used in a comprehensive highway program, even where the road surface is graveled is an important item.

There is no lack of raw material for a crushed stone plant. There is hardly a mile of the distance between Batesville and the Missouri line where suitable limestone could not be found. The best stone, however, would probably be produced from the Cotter dolomite, the oldest formation exposed, the Plattin of the upper Ordovician, the St. Clair or the limestone of the Boone chert.

Chert is not accepted as aggregate or surfacing material by the Highway Commission as most of it contains minute cracks or fractures running in all directions, invisible in a fresh specimen, but which on weathering open up and allow the chert to disintegrate into small fragments.

Lime

Small kilns burning lime for local use have been built in former years at many points in north Arkansas. The Batesville White Lime Company, of which Mr. George Weigert is president and general manager, however, was the first to enter the field in a modern technically controlled way with the idea of supplying outside markets. This com-

Figure 7

pany is now operating two plants, one about 6 miles northwest of Batesville on the Cushman Branch of the Missouri Pacific Railroad and one at Ruddells. The quarry of the former plant, Figure 6, is in the Boone formation.

Very little stripping of overburden is required, although at places clay seams extend to a depth of several feet. Dirty stone is eliminated by hand sorting to secure a clean product for the kilns. The stone lines horizontally, is thick bedded and light gray in color. A 40 ft. face has been opened up, all of uniform grade. The stone is drilled with jack-hammers supplied with air from an oil engine driven air compressor, and after blasting is hand sledged and sorted to the proper size for the shaft kilns. The spawls are discarded along with dirty stone and clay. Gasoline locomotives haul the loaded quarry cars to the plant about 3 miles distant where the elevation is such that the cars are run directly over the kilns for dumping, Figure 7.

The present plant has three kilns each with an interior cross section of 6 by 10 feet. These are fired with hardwood obtained in the district. The capacity of each kiln is about 16 tons of burned lime per day.

The burned lime is drawn off on a concrete floor, Figure 8, where it is carefully sorted as to grade and any unburned lumps discarded. The lump lime is then loaded in railroad cars or delivered to the crushing or hydrating plant.

Three new kilns are under course of construction and will be located beyond the present kilns and between them and the hydrator building, Figure 7. These new kilns will have the same inside cross section, but will be fired with producer gas from coal, generated in producers built as an integral part of the kiln. Their capacity will be greater than that of the present wood fired kilns, but the latter will continue to be fired with wood instead of coal as they produce a lime extremely low in arsenic to meet the requirements of lime used in the manufacture of food products and other chemical purposes.

The hydrating plant is equipped with a Raymond pulverizer with automatic throw-out, a Kritzer continuous hydrator with a capacity of four tons per hour and necessary steel bins and baggers. Mr. C. B. Teague is superintendent of the lime plant. Products shipped are structural and chemical grades in both caustic and hydrated lime.

Quick, or caustic lime, is shipped in bulk in lump form or crushed in barrels. The hydrate is shipped in paper bags. Structural lime is kiln run with unburned lime picked out while the chemical grade is carefully sorted to meet the most rigid specifications. It has an enviable reputation and is shipped long distances for various chemical uses where a high grade product is required.

Following are analyses of the limestone, lump lime and hydrate by H. E. Wiedemann:

Limestone

Silica	0.34
Iron Oxide and Alumina	0.27
Calcium Carbonate	98.73
Magnesium Carbonate	0.45
Sulphur Trioxide	0.20

Lump Lime

Silica	0.35
Iron Oxide and Alumina	0.64
Calcium Oxide	94.50
Calcium Carbonate	4.11
Sulphur Trioxide	0.20
Magnesia	0.19

Hydrated Lime

Silica	0.14
Iron Oxide and Alumina	0.32
Calcium Hydrate	94.50
Calcium Carbonate	4.45
Magnesia	0.27
Sulphur Trioxide	0.31
Fineness—100 mesh	100.00
Fineness—200 mesh	99.95

At Ruddells the quarry of the Batesville White Lime Company is in the Fernvale limestone of the Upper Ordovician (Figure 1). This limestone is coarse grained, massive and cross bedded, and at most exposures contains too much manganese to make a suitable lime. The color is generally dark gray. At Ruddells, however, it is pure enough to use and nearly all the lime from this plant is shipped for chemical use. Due to the traces of manganese it is not a good white color, so its use for structural purposes is limited. It makes a very quick slacking lime, called locally a much hotter lime than that from the Boone limestone. This property makes it desirable for certain chemical uses. No lime is hydrated at the Ruddells plant, quick lime only being produced. The quarry is located well up on the hillside above the plant and the stone is lowered down an incline to the tops of the kilns. There are four of these, all wood burning. The cordwood is secured from a radius of several miles and hauled in by wagon or shipped in by rail. A large stock is always maintained so that only thoroughly seasoned wood need be used.

Resources of Limestone for Lime

There is considerable variation in composition in a horizontal direction of the limestone of the different formations, so that while at some places almost any of the limestone above the St. Peter Sandstone would be suitable for the manufacture of lime, they are not by any means universally so and locations could not be picked at random. Places can be found, however, where the necessary conditions of transportation and physical and chemical properties of the stone coincide. As the district develops and available markets expand, further developments are certain to take place.

Below the St. Peter Sandstone the limestones are

high in magnesia and at the same time contain too much silica to allow their utilization for high magnesian lime.

Silica Sand Resources and Development

The St. Peter Sandstone so extensively developed in Illinois and Missouri, in the St. Louis District is exposed for considerable distances along the White River in the lower part of the valley. It is very persistent over the Ozark region in northern Arkansas, but at other points is too far from transportation to permit of commercial development.

It constitutes the only known source of high grade silica sand in Arkansas or Louisiana from which continuous shipments of a uniform grade can be made suitable for high grade glass and chemical use. It first outcrops near Williamson spur on the Missouri Pacific Railroad, about 22 miles northwest of Batesville. From here on northwestward the outcrop is almost continuous, except at points in the lower valley where local folds depress it below the river level. Following the general dip of all the rocks of the area it gradually rises to the north and west until it is near the top of the hills remote from the river. The thickness varies from 100 to 200 feet, but only part of this is suitable for silica sand. Also there is considerable variation in a horizontal direction as at many places the rock is too fine grained to make a suitable product or too hard and firmly cemented to permit of easy crushing down to the individual quartz grains.

Due to the steep hillsides the overburden soon becomes heavy, making it necessary to resort to underground mining through tunnels. This, however, is no particular disadvantage and in some ways a decided advantage, as has been found at Crystal City and Pacific, Missouri, and the development on White River at Guion. The physical and chemical properties of the grains of the St. Peter sandstone, and the geology of the formation have been discussed in many reports.

The Silica Products Company, Inc., of which Mr. D. D. Dunkin is manager, has been successfully producing high grade sand for various industries, mainly glass making, for some years. The mine and preparation plant are located at Guion, a station on the Missouri Pacific in Izard County, about thirty miles above Batesville. Formerly the sand was recovered by open quarry methods, but heavy overburden and the desire to produce an ideal, carefully selected product caused a change to underground mining about two years ago. Careful sampling showed that a bed about 16 feet thick, 12 feet below the limestone cap, contained the most desirable sand. Chemical and sieve analyses of this section, reported by the Company are as follows:

Chemical Analysis

Silica	99.38
Alumina	0.57
Ferric Oxide	0.028
Lime	0.01
Undetermined	0.012
	100.000

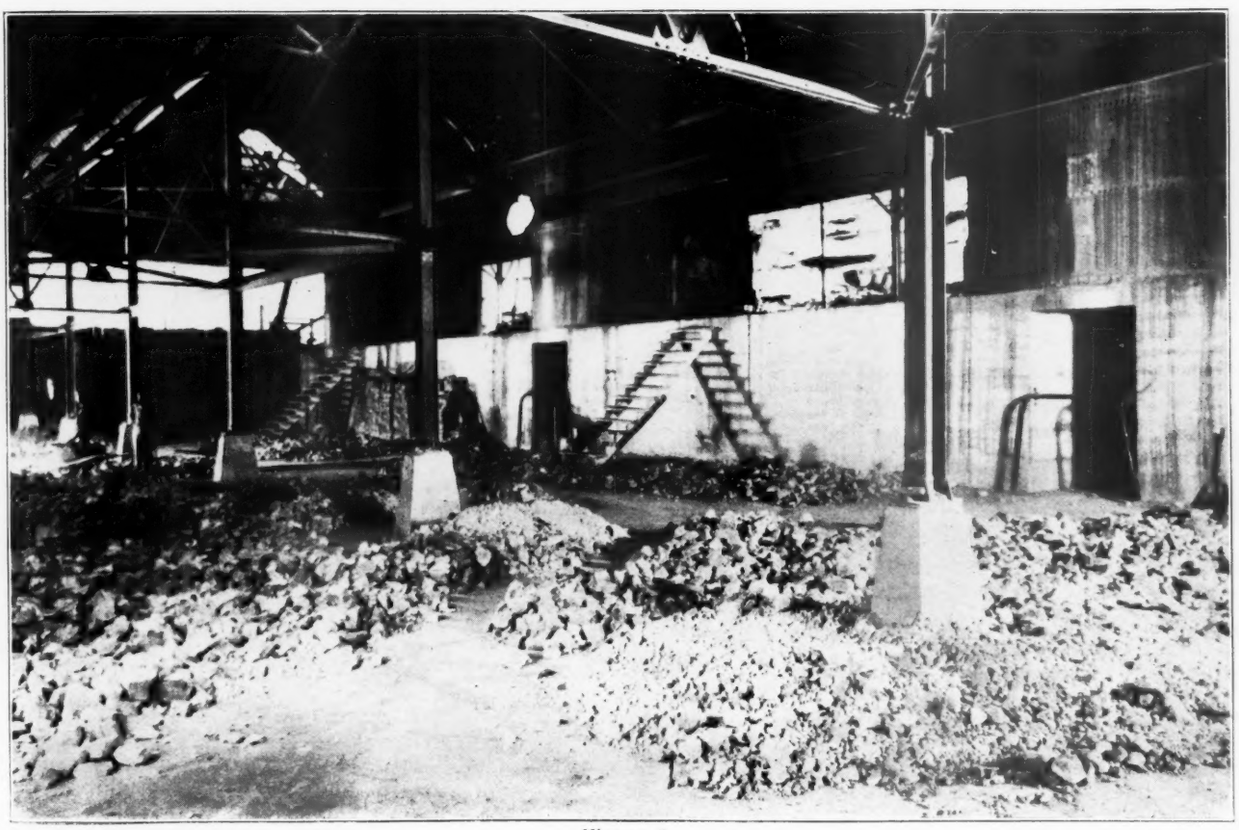


Figure 8

Sieve Analysis

	Per cent
On 28 mesh	1.2
Through 28 mesh or 35 mesh	20.0
Through 35 mesh or 48 mesh	29.1
Through 48 mesh or 65 mesh	31.2
Through 65 mesh or 100 mesh	10.0
Through 100 mesh	8.5
	100.00

The mine is entered through tunnels, the floors of which are some twenty feet above the old quarry floor. The general method of mining is to leave pillars of sandstone of sufficient size and sufficiently close to safely support the roof. This leaves about sixty per cent of the rock in the mine as pillars. According to Dunkin the tunnel or drift is driven straight in and is sixteen feet high by forty feet wide. Rooms are turned off this every one hundred feet, the turn being narrower than the room width, or about 25 feet wide. This is widened out to forty feet. Rooms are connected by cross cuts every eighty feet.

The face of the room is drilled with Waugh 93 jackhammers fitted with a needle with a large hole and air by-pass. The hollow steel used also has an extra large hole so that the cuttings can be quickly blown out by shutting off the drill and by-passing the air which is done every few seconds. About 34 holes, 12 feet deep, are used to make one advance at the face. This brings down 400 to 500 tons of sand, and little or no secondary blasting is required. In blasting, one to three sticks of 60 per cent gelatin dynamite are used in the bottom of the holes with the heaviest burden. 40 per cent extra gelatin is used for the rest of the loading. The sand is loaded by hand into two-ton roller bearing bottom dump cars, which are pushed by hand, down grade, to the mine entrance where they are dumped into storage bins. The cars are returned to the face by mules.

The sand is removed from storage by a power operated hoe type drag into a car which in turn is pulled up an incline and dumps into the mill bins. From the mill bins it goes first to a 16 inch Blake type crusher, then by elevator to a thirty foot rotary dryer fired with oil. From the dryer the sand goes to two trommels in series. These are each 4 by 9 feet. The "Through product" will all pass a 28 mesh Tyler sieve. The oversize goes to a small set of rolls and is returned to the screen. The screened sand goes to a special grader, which has been designed and patented by Mr. Dunkin, for the removal of excess fines. The finished sand goes to storage bins and railroad cars and the fines to waste

At Guion the Silica Products Company is also producing an excellent molding sand for foundry use. This does not, of course, come from the St. Peter Sandstone, but from a deposit of recent formation, formed by the weathering of older rocks. Laboratory tests of this sand have shown it to have good bonding strength, good permeability and durability and it is finding a market for foundry use even at considerable distances from the point of production.

The sand grains are pure silica allowing continued re-use of the sand with little degradation. The bond is a clay high in hydrated oxide of iron.

Silica Sand Development Possibilities

At the present time the development at Guion is able to supply the available markets; in fact, the product has been shipped all the way to Mexico on account of its purity and uniformity. However, the St. Peter sand could be advantageously used for other purposes such as in the manufacture of sodium silicate (water glass). Hydro-electric power to be developed on White River would be of no particular benefit in the manufacture of this product, but the projected gas mains from the Louisiana gas field to St. Louis, if an actuality, should pass not far to the eastward of this district and afford an ideal fuel. Probably the present best opportunity is for the manufacture of sand lime brick. Good lime is available nearby, the pure white sand makes an ideal aggregate, available electric energy for motive power will be available, so the only fuel needed will be that required to generate steam for curing. Good transportation is available.

Cement Resources

The best natural resources for the manufacture of Portland Cement occur in the eastern part of the valley. Here the limestone of the Boone and the overlying Moorefield shale are exposed at several places near to each other or have been brought so by faulting. At the same time these locations are near transportation and good water supply. This most promising district begins north of Batesville and extends northwestward up the river for approximately twenty-five miles. There are deposits of surface clays that might possibly be used, but the Moorefield shale is the most obvious and reliable source of the necessary silica and alumina. It is fairly uniform in character and forms much of the surface rock from Moorefield (for which the shale was named) east of Batesville to two or three miles west of Batesville. To the westward it outcrops on the steep hillsides. Its total thickness is from 100 to 200 feet, although this total would not be available as at places in the vertical section there are thin layers of interbedded sandstone that make it unsuitable.

An analysis of a 40 foot vertical section from an exposure 1 mile west of O'Neals gave the following results:

[1]Dunkin, D. D. Mining and Preparation of St. Peter Sandstone in Arkansas. A. I. M. & M. E. Technical publication No. 55, 10 pp. New York meeting, 1928.

	Per cent
Lime	5.30
Magnesia	2.00
Alumina	15.10
Iron Oxide	5.15
Silica	63.12
Loss on ignition	8.86
	99.53

A combination of 23 to 24 per cent of this shale with 77 to 76 per cent of the high grade Boone limestone in the district will give a portland cement of approximately normal composition. One cement company has already purchased an area in this district after thoroughly drilling the property.

Other of the limestones besides the Boone and above the St. Peter sandstone are pure enough for cement manufacture, but shale cannot always be found immediately adjacent. It can, however, be obtained within a few miles and near transportation. Near Pfeiffer, a village 7 miles north of Batesville on the Missouri Pacific, the Chattanooga shale occurs in sufficient thickness, 20 to 30 feet, to be used as a source of supply. The Boone limestone is also available here. Farther northwest the Chattanooga shale is absent or too thin and impure to be considered.

The transmission lines of the Arkansas Light & Power Company are now in this district and these will eventually be tied in with the proposed development on White River farther north so that electric power is assured. The district is not far from the southern Illinois coal fields or those of Arkansas. Fuel oil from southern Arkansas or Louisiana could also be used, or natural gas from the possible future mains between Louisiana and St. Louis.

Clay Resources

All the true clay deposits of the White River Valley are of recent origin and are the results of weathering of the limestones, sandstones and shales of the older formations. Due to the rugged topography and steep slopes the deposits are in most cases of small extent and variable in composition. For this reason there is but little hope of their development except perhaps locally for the manufacture of common brick.

With the shales, however, it is different. These furnish a source of raw material for heavy clay wares, such as brick and tile, which will eventually be developed. The most promising is the Moorefield shale in the Batesville and Moorefield District. As far as known it has never been utilized in a commercial way but experimental tile of good quality has been produced.

[8]Mansfield, G. R. Mining and Metallurgy. January, 1928, page 19.

[9]Purdue, A. H. Developed Phosphate Deposits of Northern Arkansas. U. S. Geol. Sur. Bul. 315, page 462 (1907).

[10]Branner, J. C., and Newsom, J. F. The Phosphate Rocks of Arkansas; Arkansas Agr. Exper. Stat. Bul. 74, pages 61-123, 1902.

It is, of course, red burning, and unless the lime content is high enough to cause trouble should work and fire satisfactorily. Sources of fuel supply would be the same as mentioned under cement.

Phosphate Rock

Mansfield[8] estimates the phosphate rock available in Arkansas as 20,000,000 long tons. This is, of course, small as compared with the Florida, Tennessee and Western field reserves, but has the advantage of being centrally located in an agricultural district ready for development as the Tennessee reserves are depleted.

The area containing the phosphate beds extends from a point ten miles north of Batesville, westward to the town of St. Joe in Searcy County, a distance of 80 miles. This entire area does not, however, contain phosphate that could even be classed as low grade, as only at certain points is the concentration sufficient to give any promise of economic value. At most exposures the formation is represented by only a thin bed of shale or ferruginous or manganiferous conglomerate. As far as at present known and explored the eastern end of the area is the best and is the only part in which exploitation has been attempted.

Geologically the phosphate beds occupy a position equivalent to the Cason shale. The typical Cason shale is usually absent when the formation is highly phosphatic, but it is probably a local variation of this formation. This places it at the top of the Ordovician beneath the St. Clair limestone and above the Fernvale. The best known exposures are on West Lafferty Creek in the western part of Independence County. Here it outcrops along both banks of the creek valley at a point about one and one-half miles, as the creek flows, from White River and the Missouri Pacific Railroad. According to Purdue[9] at this location the phosphate rock is 8½ to 10 feet thick, divided into a lower and upper bed by a thin stratum of manganiferous iron ore. He gives the following section:

Section at Old Quarry on West Lafferty Creek

	Ft.	In.
St. Clair Limestone		
Brown to black shale	2	0
Low grade manganiferous iron ore	0	15
Green to dark clay shale	0	14
High grade phosphate	4½-6	0
Manganiferous iron ore	0	2
Low grade phosphate	4	0
Polk Bayou limestone		

"Polk Bayou Limestone" was the name used in the older Arkansas reports to designate the formation now subdivided into the Fernvale and Kimmswick. In addition to the work of Purdue the phosphate deposits in the lower valley have been described by Branner and Newsom[10].

Purdue[9] gives the following analyses of samples of phosphate rock from West Lafferty Creek where the section given was measured. Numbers 14 to 18 were from the upper bed and number one from the nower bed.

No.	Where taken	P_2O_5 Phosphoric Acid	$Ca_3(PO_4)_2$ Equivalent in Calcium phosphate
14	4 in. from top of bed	25.86	56.45
15	Middle of bed	27.24	59.46
16	8 in. from bottom of bed	27.40	59.81
17	Black phosphate (weathered surface)	32.60	71.06
18	Composite sample	29.18	63.70
1	From lower bed	13.46	29.38

Past and Future

Over twenty years ago the phosphate rock deposits on Lafferty Creek were opened up by the Arkansas Phosphate Company, a railroad spur was extended up the creek from the Missouri Pacific Railroad, and a plant built for the treatment of the rock. The rock from the upper bed was mined at first by open quarries and later through adits driven into the hill. After some months' operation the plant was destroyed by fire and not rebuilt. Instead the successor of the original Company, the Arkansas Fertilizer Company, built a plant at Little Rock and continued to use the rock from the White River District. Eventually the Tennessee deposits developed a higher grade rock than could be obtained nearer home, and it was found that the increased freight charges could be just about balanced by the increased percentage of phosphate. So the Arkansas operation was closed down and held as a reserve for the future.

At the present time two large fertilizer companies have holdings of very considerable acreage in the district. These were acquired after careful examination and investigation and apparently are being held for future development.

The Arkansas rock is not high grade as compared with the Florida and Tennessee product and is not susceptible of beneficiation or increase of grade by cheap washing or gravity concentration methods. It could be used for the production of acid phosphate for consumption within a restricted area with possibly some advantage over other fields where the freight differential would balance the lower grade.

However, its greatest possibilities lie in the field of high grade phosphate products or phosphoric acid manufacture. Improvements in methods of distillation either with fuel or electrical energy may entirely change the technology of the industry. Fuel, either coal or petroleum, is now available at reasonable rates and natural gas possibly soon will be. Cheap electrical energy is a matter of the near future. The consumption of high grade or concentrated fertilizer will increase as the farmers become educated to its use and advantages so that it may be necessary to greatly modify the present method of treatment of even high grade rock to produce a marketable product. Improved methods may then put the lower grade raw material more on a par with the high grade under favorable conditions.

Construction Costs Drop

A drop in construction costs in the United States in comparison with last year and the year before is indicated by the latest data. Contractors generally throughout the country are found to be receiving approximately $6.75 per square foot of floor area for new work undertaken so far in 1928. This is the average for all classes of structures. In the corresponding period last year $7.16 per square foot of area was paid. In 1926 the unit price was $7.27.

Present costs are still somewhat above the general level of the past eight years, records for the period reveal. The decline of 41 cents per foot since 1927 is found, however, to be the greatest in any year under consideration.

Prices are seen to vary widely with the different types of construction. The cost of public buildings is comparatively high, averaging $8.40 per square foot of space. Church building is only a little less costly, averaging $8.25 per foot. Industrial buildings cost $7.03 per foot, schools $6.31 per foot, office buildings $5.90 per foot. Residential building is shown to be the lowest of all, the average here being $4.99 per foot. It is noteworthy that the lowered scale of building prices is being accompanied by the greatest construction program in the country's history.

Worker's Output Compared

The United States leads all other nations in the productivity of its workers, according to an estimate from official Government sources. Taking the average output of the American workman as 100, the Canadian, who is his nearest rival, is said to produce at the ratio of 70. The ratio for England is set at 60, or 40 per cent below the American standard. For Germany it is approximately 40, for France 33 and for Australia 30.

In Poland the ratio drops to 13, and in Italy to 8. In Japan it is only 7, and in Russia 3. These estimates are believed to picture with substantial accuracy the comparative productivity of labor in the nation's listed.

The superior productiveness of labor in America is considered to be due in part to the skill and efficiency of the workers themselves, and partly to machine processes and scientific management. The stimulus of a high standard of living and widespread opportunity also is reflected in the greater productive effort of the average American worker, it is held.

SUCCESSFUL COLLECTION PLANS

WHEN a bill isn't met promptly, it all falls back on the collection manager and his letters. And the question that the harassed credit man wants answered is, "How can I write collection letters that will bring in the cash without arousing the customer's ill will?"

In looking over the bills that his customers owed, one collection manager came across an account that had been outstanding for over eight months. He went over all the statements and letters he had sent this man. They were all friendly and the debtor could have taken no offense at any of them. Then why didn't he pay? Apparently there was no reason for it. Yet the bill was grossly overdue and the money hadn't come in. So the collection man decided to write the customer a letter that would make him feel so cheap that he would come across right away.

Whether he ever wrote the letter or not is a question. But if he did, was he right in doing so? Would the customer pay his bill simply because the collection manager had made him feel cheap? He might; but the chances are that after he had read the letter he would put off paying his bill until he got good and ready to so do.

Whose fault was the whole situation? The customer bought the goods; and he should have paid for them when the amount fell due. But maybe he couldn't. Perhaps unforeseen financial troubles prevented his straightening up the account. Or maybe he was simply letting this account run on because it was easier to stave off a genial collector.

How Collections Can Be Made Without Arousing Ill Will

One successful plan is based on the theory that human interest is the biggest single aid in collecting money. The man who uses this plan believes that the customer will pay his bill promptly if he is treated with the same courtesy and consideration as the credit man himself expects to receive from his creditors. A little device of his is to write across a slip of paper attached to the top of every overdue bill he sends out to his customers as follows: "Dollars are worth so little today that I am sure you will not mind sending me the few you owe." The customer inevitably notices the note the minute he opens the envelope.

"This little device has done more good in collecting accounts for me than an ordinary dunning letter possibly could," declared this collection executive out of his experience. Perhaps it has a personal touch that is usually lacking in the average collection letter. But whatever the reason is, it seems to make the customer feel that he should do all he possibly can to straighten up his account.

Another credit man has found from his experience that a heart-to-heart talk with the customer will do more good than a hundred formal statements or letters. "The customer is only human in his ability to withstand logical argument," he declares, "and the executive who writes to him as a human being, in a man-to-man way, instead of sending him a piece of paper with a mere statement of his account on it, is going to get more than a mathematically proportionate share of any money that is available for creditors."

In contrast with this method just described is a plan that another executive has used with good results. This man never puts a signature on his collection letters, just the firm's name and address. He says his experience has been that when a customer receives a collection letter with a personal signature on it he usually holds the signature responsible for the "sting" that he may feel the letter carries.

"A great many people," he says, "have an abhorrence of even a polite letter reminding them that they have failed to pay their bills. They resent it, no matter how courteously the letter is worded, and if it has an individual signature on it they think that someone in the concern has a grudge against them and likes to hound the life out of them about their bills. When only the firm's name is used, the customer is less likely to get the impression that the writer is injecting his personality into the letter."

Another collection plan that effectively produces worth-while results consists of writing a friendly letter to all customers who, for some reason or other, have neglected to settle their accounts at the time they became due. The following is a sample of one of the letters: "If it is not convenient for you to pay your account in full, we shall deeply appreciate it if you can help us out with a payment of whatever you can spare at present. We do not want to dun you, and if you can't pay just now pay no attention to this request until such time as you may be in a position to favor us. Thank you very much for your business."

The customers who receive this kind of a letter represent the best trade that this concern enjoys. If they were not of this type, the letter would fail in its purpose, for there are always customers of the less desirable type who would take advantage of the offer that the letter carries and put off paying their bills as long as they possibly could.

Personal Contact Need Not Be Confined To Small Concerns

Some executives think that this human interest idea in collection plans can only work out when a

collection man knows the customers personally and that it is usually impossible for the collection man to have this advantage. When the concern has thousands of accounts, the collection manager cannot begin to familiarize himself with every one of his customers. But he can come somewhere near that if he takes the time and trouble to do what one business man is doing.

This executive had every salesman in his concern instructed to make out a "personality report" on every customer with whom he regularly comes in contact. On the face of it, this may seem to be a lot of unnecessary work. But it only means writing a brief, personal note about the customer some time after he has seen him. The note may only give a comparatively unimportant fact about the customer; but that is likely to be sufficient. With this information, the collection manager can sit down and write a really personal letter to the customer and get better results than if he did not know about the likes and dislikes of the person with whom he is dealing at long distance.

"Of course, in a large concern where there are a great number of changeable accounts," added the man who uses this method, "the salesman may not get a chance to write these notes about every one of his customers. But he can at least jot down a little about some of them in his spare time, between sales. Then, when the time comes for the statements to be mailed out, the collection man will have some definite information to work with instead of a mere list of names, addresses and ledger balances."

The executive who uses the next plan believes that the main thing for a collection letter to accomplish is to get the attention of the customer. "There are a number of different ways to do this," he explains. "One can do it by sending with the collection letter, or separate, a small card, or notice of some kind, that will appeal to the human side of the customer."

This collection manager has by the 11th of the month a list of all customers who have not paid their bills. When this time comes around he sends out the notices, printed in red ink. The card is sent out in a plain envelope. The card calls attention to the fact that the customer has not paid his bill and that the firm would appreciate it very much if he would do so right away.

The attractiveness of the notice—it is artistically designed and printed—gets the customer's attention the minute he opens the envelope. He naturally wants to know what the notice is all about, and he takes the time to read it. He usually sends in his check after he reads it, but if he doesn't he gets a blue notice a few days later.

This is a card, about the same size as the overdue notice, bearing the following message: Blue. This is how I feel after not having heard from you in response to my overdue notice. And I shall feel even more blue when I have to discontinue extending the liberal credit I have given you in the past.

Another attention-getting plan that is producing good results consists of a small slip of paper about two inches long and an inch wide. It is sent by itself in a special envelope. The message on it, printed in yellow ink on a black background, has these words across the top of it: "Past due." Underneath this there is a hand pointing to the following message: "This account has no doubt escaped your notice. Will you please favor us with a remittance by return mail? We will appreciate it very much if you do."

This usually gets the bill paid. If it doesn't, the collection manager takes up the account with a Credit Association. In comparatively few cases, however, is this necessary.

In talking about attention-getting cards and notices, one collection man says that they do not necessarily have to be separate from the collection letters. He says they can be included right with the letters themselves. As an example of this, he encloses with the personal letters he sends out to his customers a slip of paper with the word "Paid," printed in large letters across the face of it. The paper is attached to the top of the letter in such a way that it gets the customer's attention the minute he begins to read the message.

The letter he sends with the slip says, "I would like to send you a slip like this one, but I am afraid I can't because you haven't paid your bill. I can, though, if you will send me a check. Don't you want to do this? I am sure it will make you feel a lot better and I know you would much rather get a "Paid" notice than a statement of your account. May I expect a check from you some time soon? The man who uses this plan says it does more good than anything else he has ever tried in collection letters.

Getting the customer's interest in the first collection letter—and holding the interest throughout the rest of the letters—is also the basis of another successful collection plan. The letters are well worth describing here because they illustrate, remarkably well, the pulling power of collection letters that have as their main object the idea of getting the customer's immediate attention.

The first letter of the series goes out with a statement attached to it. A small piece of string holds the two together and gets the customer's attention the minute he sees it. The letter reads as follows:

"Do you remember when you were young and the good folks sent you down after something—they were very likely to tie a string around your thumb to make certain you would not forget?

"Those were happy days, were they not?

"But—there's no reason why the days of now

(Continued on page 62)

PORTO RICO LIME PLANT SOLVES PROBLEM

By Jose E. Berrocal

THE lime plant owned by Mr. Jorge Bird Arias was established about the year 1870, when it consisted of a small pot kiln erected on the small key called Hicaco, four and one-third miles off the coast east of Fajardo, Porto Rico. The limestone burned in the plant is quarried on this small island. This pot kiln was operated until a greater demand for the product required the installation of a larger unit. This unit, consisting of a continuous furnace fired kiln of a capacity of 12 tons per day, was erected in Fajardo very near the sea shore. Wood was the source of fuel at that time but later on the scarcity of such valuable material compelled the superintendent to substitute coal.

Business continued to grow to such a degree that a few years later another kiln of the same type and capacity as the former was erected and both were provided with the required pipes and fans to use the Eldred System. Many difficulties were met with in the use of coal and to these difficulties were added those of the limestone itself which possesses the properties of being too soft and of cementing together at a relatively low temperature. Kiln production was far below its maximum and frequently the limestone inside the kiln cemented together and hung so as not to allow drawing the lime.

When this occurred the kiln men had to break the mass into small lumps by means of steel bars. This was hard work to do and besides, the good quality and production of lime was affected. Then a combined process was tried which consisted of introducing with the limestone, into the kiln, a small amount of coke. This change improved a little the conditions but did not eliminate absolutely the difficulties already described. Many manufacturers of kilns were consulted with regard to this problem and on three occasions practical experienced lime kiln operators were employed to study and solve the problem but unfortunately their methods were unsuccessful. The difficulties continued. Wages were going higher every year and lime production and thermal efficiency of the kiln did not improve. All these inconveniences demanded an immediate scientific investigation.

J. E. Berrocal In a Corner of the Laboratory

In February 1928 the services of a chemist were acquired to investigate the existing conditions and to determine the best and most economical way to burn this limestone. For a series of experiments that it was decided to conduct, kiln number 1 was selected, leaving number 2 as it was usually operated, so as to change only in the least the general routine of the plant. The chemical composition of the limestone was already known according to the following analysis:

$CaCO_3$	99.20
$MaCO_3$	0.23
R_2O_3	0.00
SIO_2	0.03
Organic Matter	0.54

Figure 1.—View of the Quarry at Hicaco

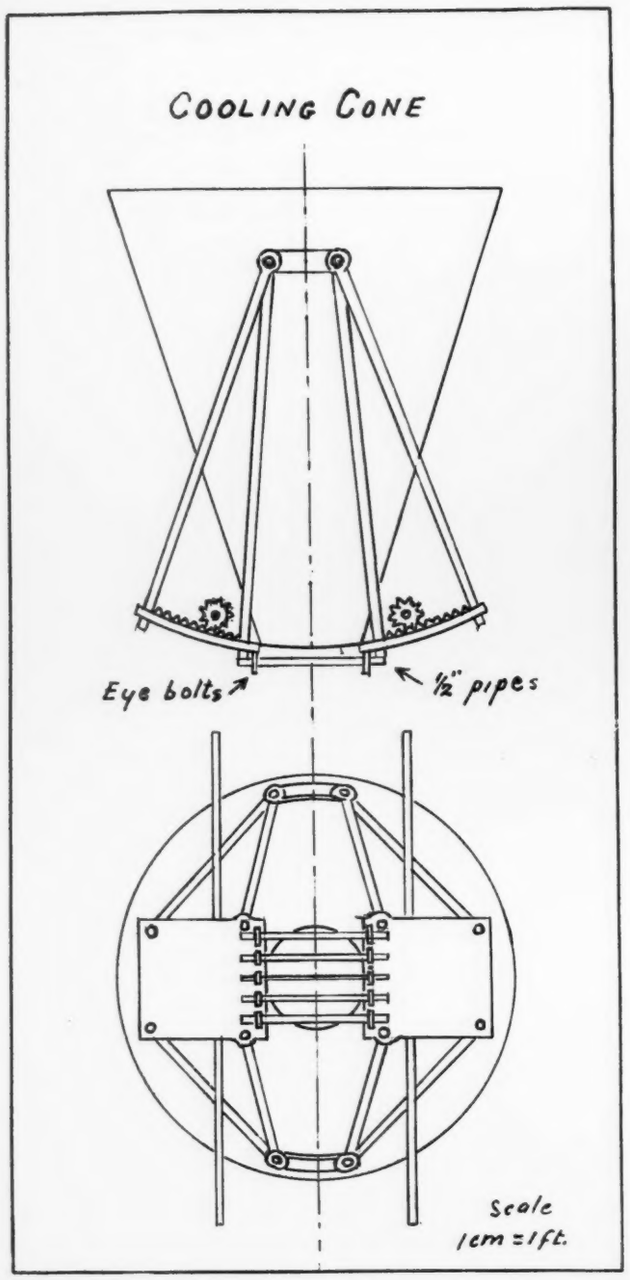


Plate I.—Details of Arrangement Made In Cooling Zone

Limestone as it enters the yard is selected according to size and color and separated into two classes called first and second class. The former analysis is of the first class stone.

A recent analysis of the second class stone (made in the laboratory which was equipped for the performance of these investigations) is as follows:

$CaCO_3$	98.900
$MGCO_3$	.419
R_2O_3	.075
SIO_2	.076
Organic Matter	.045

The first class stone is exclusively used in the production of calcium oxide and hydroxide while the second class is pulverized and sold as agricultural limestone with the following screen analysis:

Showing Limestone In Storage

Per cent passing through	Mesh
95.0	20
83.8	40
67.7	60
52.5	80
42.8	100

As already mentioned, a small laboratory was equipped so as to scientifically control the process

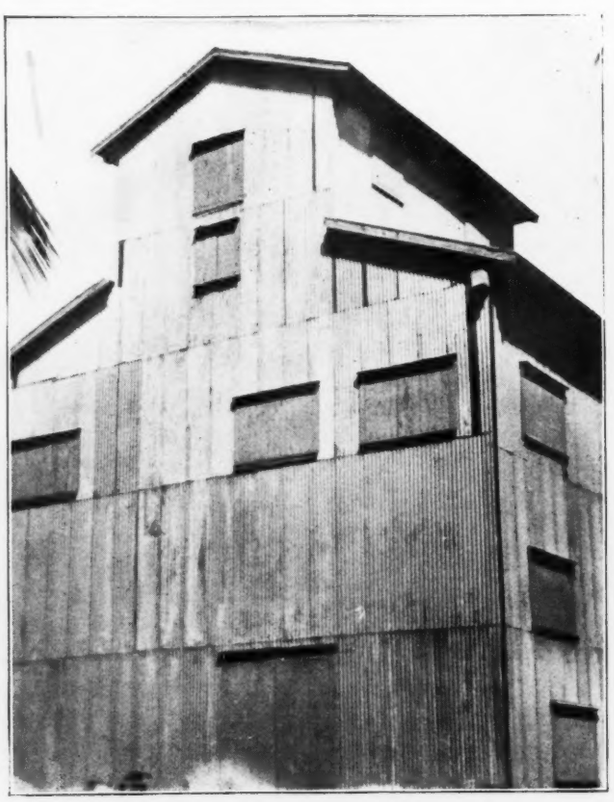


Figure 7.—The Hydrating Plant

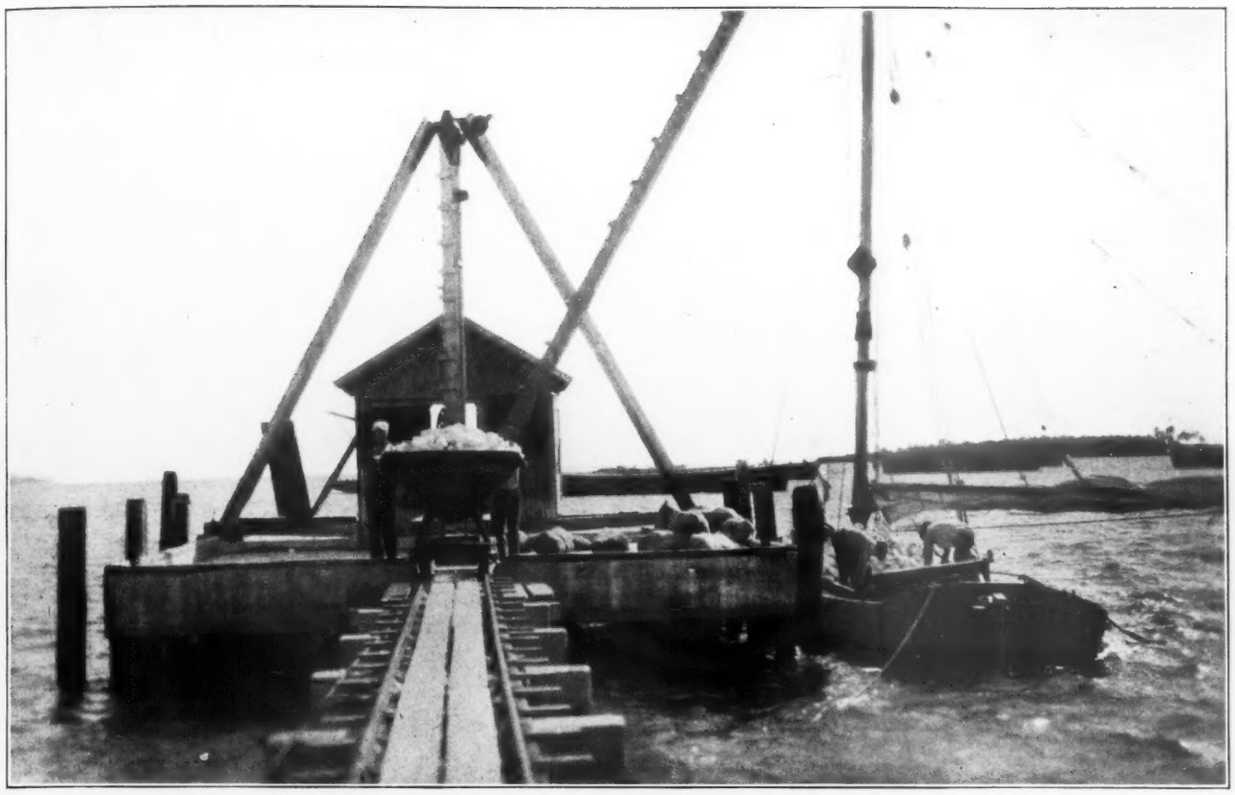
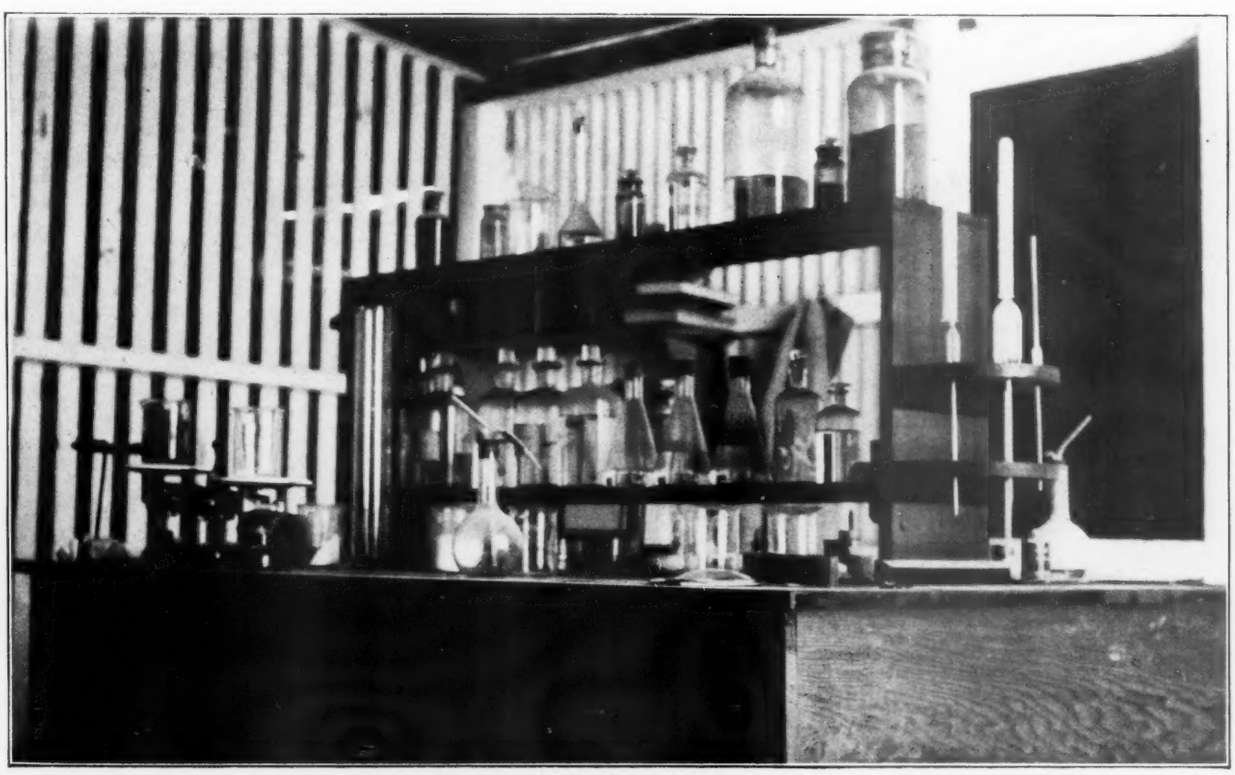


Figure 2.—Unloading Limestone Brought From Hicaco to Fajardo

of calcination. Determinations of CO_2, O and CO were made in this laboratory at frequent intervals. Temperature and draft of flue gases were recorded, and the lime was tested for its rate of hydration. Not a long observation was required to determine that combustion was far from perfect and that the lime was very irregularly burned. On many occasions draws were made of overburned lime, especially when the kiln had been "hanging."

It was the purpose to raise to its maximum efficiency the combined process which was formerly used so as to have a good data to compare it with the other changes that were to be carried on. Something was done in this line but due to lack of time



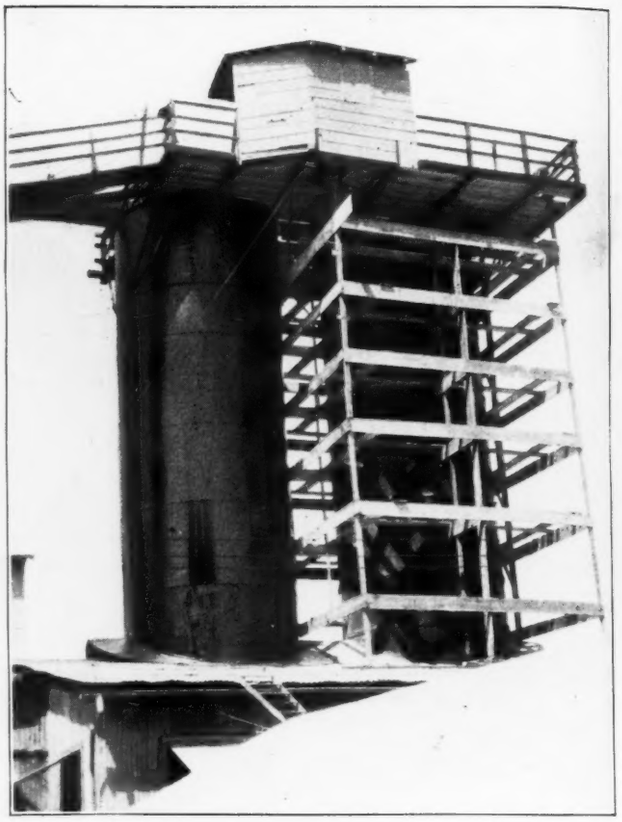
The Working Table at Laboratory

(as this plant burns lime only 5 to 6 months in the year) the program was conducted without paying much attention to small details.

The program was to simplify the process by gradual elimination of the various combinations of systems used. The first step decided was to eliminate the Eldred System. There was no prejudice against this system but the purpose here, as already stated was to simplify the method and so the Eldred System was eliminated. Really, after this first elimination, the lime improved in color, and physical properties.

The next step was to either eliminate the coke inside the kiln or the fire in the furnaces. The decision was made to eliminate the fire boxes, as it seemed the trouble was more probably due to the properties of the stone, and to transform the kiln into one similar to the Belgian type. Fire boxes were sealed with bricks and by means of eye bolts placed in the draw shears of the cooling cone and pieces of ½ inch pipe placed as cross bars to provide a sort of grate.

A fire was started inside the kiln and a given amount of stone and coke were dropped into it until the level reached the storage zone. The kiln was drawn and charged at regular intervals and continued producing uniformly burned lime to the end of the burning season. Progress of calcination was evidenced by means of the CO_2 content of flue gases. This progress was continued for several weeks and changes were made in the proportion of coke used so as to determine the most economical ratio. The burning season was over and it was necessary to finish the experimentation without reaching the degree of refining desired.



Kilns—Inside the Small Room In the Platform Is An Electric Hoist to Pack Up the Limestone

The advantages obtained with this process over the old system were so many that the manager de-

Figure 4.—Incline to the Kilns

Figure 6.—The Pulverizing Plant

cided to adopt it indefinitely and for that purpose kiln number 2 was also modified. Production was increased from one ton every 3 to 4 hours to every 1 hour 45 minutes. Labor was saved and quality of product increased. An examination of the kiln showed that the lining was not so badly damaged as in previous years.

The coke used during this experimentation according to analysis was as follows:

Moisture	0.3211
Ash	16.9500
Vol. Matter	1.7130
Carbon	81.0160
Sulphur	0.7390
B. T. U., Lbs	11,289

Due to the procedure of mixing stone and coke and to the size of the coke it was not possible to obtain a high thermal efficiency (13% coke $CACO_3$) but it is expected, by controlling these two factors, this condition will be improved at the first opportunity.

The production obtained per cubic foot per day was around 15 pounds. The kiln was very easily operated. The charge was made every six hours and the draws every hour and forty-five minutes. Temperature of the flue gases indicates the height of the burning zone and therefore, the frequency of draws, to maintain such a zone at a given height.

Besides the equipment already described the plant has a Schulthess continuous hydrating plant with a capacity of 20 tons every 10 hours, a pulverizing mill and a small layout to assemble the steel drums which are used as containers for the lime. The hydrate plant was designed and built by the McGann Manufacturing Company.

Automobiles on the Farm

Automobiles in use on the farms of the United States number 5,007,124, according to the latest announcement of the National Automobile Chamber of Commerce.

Texas leads all other states in the number of farm-owned automobiles with 314,000 cars, it is shown. Ohio is second with 244,000 machines. Iowa has 240,000 cars on its farms and ranks third. Illinois with 234,000 and Pennslyvania 230,000 are next in the list.

Passenger cars comprise approximately 88 per cent, or 4,409,470 of all automobiles on the farms, the Chamber's figures reveal. Trucks and tractors make up the remaining 598,654 machines.

First rank in passenger cars also goes to Texas, with 288,211 machines of this class. Iowa takes second place with 217,350 and Illinois third with 208,549. Ohio with 209,031 cars drops to fourth.

In motor trucks New York takes the lead. Farmers of that state own 28,585 such machines. Pennsylvania's farms have 36,611 trucks, Ohio's 35,545, Wisconsin's 28,760, and Illinois's 25,843. The total rural registration of 5,007,124 cars on January 1, 1928, represents a gain of 10 per cent over January 1, 1927, when 4,528,442 machines were recorded.

World Gasoline Prices Compared

Gasoline costs less in the United States than in any other country, according to figures of the U. S. Commerce Department. Americans motoring abroad this year will pay anywhere from 5 cents to 35 cents more per gallon for fuel than in their own land, it is indicated.

Eighteen cents per gallon is taken as a representative price, without tax, of straight gas in this country. By comparison, car owners in England are shown to pay on an average 5 cents more, or 23 cents per gallon. Motorists of Austria are charged in the neighborhood of 25 cents per gallon; those of Germany 28 cents.

In Egypt the price of gas reaches a level of 31 cents. In France and Japan it is a penny higher, or 32 cents. Argentina and China pay 38 cents each.

Three countries are shown to have a gas price above 40 cents per gallon. In Australia it is 42 cents; in Spain it is 47 cents; while in Italy it soars to 53 cents. The prices quoted are, in most instances those prevailing in the capital cities of the countries listed at the time the survey was made.

Pure Water and Quick-Setting Cements

Contrary to popular opinion, pure water does not readily break down quick-setting cements such as are used in water mains. If pure ingredients are used and the mix is made rich good results may be expected. At least seven installations over 20 years old were still found to be in good condition.

(Continued from page 56)

should not be just as happy, and it's just as certain that some of us are likely to forget the little things of yesterday.

"Because of that we are sending you this little reminder—not to forget to pay the enclosed statement.

"We hope you enjoy the smile in our letter, and that we may have the pleasure of hearing from you promptly. Sincerely yours,

"Tie the string—
and you won't forget—"

The second letter goes out a week later. It also has a string in it, with a statement attached which reads:

"Willie's mother had just given her little boy a lecture and told him that his every act was known to God—that God's eye followed him wherever he went.

"Willie went down the street, ashamed of himself, and his faithful dog followed close behind. In a few minutes Willie turned into a lane, saw the dog and delivered himself of, ' 'Aw, go on home and quit yer follering me around. Ain't it enough to have God wid me all the time without you tagging on behind?'

"Now we don't want to be tagging on behind. We don't want to annoy or bother you one bit—but we do want to remind you that we have sent you already one copy of the enclosed account and we should be pleased to have your prompt settlement.

"When will you oblige us?

"Earnestly yours,

"Yes, that's a piece of the same string we sent you with the other letter. It will prevent your forgetting this time. Use it."

What This Plan Did

The series consists of five letters in all. The string idea, however, is discontinued in the last three letters and the customer simply told, in a friendly way, that he has an obligation to meet and that he should attend to it as soon as possible. The last letter is the most severe of all and is registered so that the customer won't have a come-back and be able to say that he hasn't received it.

The results of this series are interesting. One concern sent it to a number of old accounts that they never expected to hear from again. They collected every one of them. Another firm took 20 year old accounts that had been written off the books years ago. They tried the letters on them and succeeded in getting them all paid up. One collection manager dug up ten accounts—all of them were at least six months old—and sent them the letters. By the time he sent the third one out he had either received payment in full on all of the accounts or he had definite promises that they would be settled in a short time.

The success of the series is, of course, due to the human touch that goes into every letter. But the string idea in the first two letters gets the customer's attention first of all and makes him want to read the whole series. After he reads it he is usually so pleased with it that he pays his bill promptly so as to keep in favor with the concern that has treated him so well.

The idea back of this particular series is carried out effectively in another collection plan that is making the money come in constantly and always on time for the man who is using it. He gets the customer's immediate attention by telling him straight out that he is losing money by not paying on time. And he does this by means of a little card that he puts in every collection letter he sends out. The card says: "Are you taking your cash discount? If not, you are losing one of your easiest profits. Begin today. Cash discount is a premium we offer for prompt payment."

This awakens a new interest in the customer and makes him realize that he can save money by paying his bills promptly. He takes advantage of the fact, and after this mails his check right after he receives a notice or statement telling him that his bill is due.

A few collection managers seem to feel that the collection letter shouldn't be too personal or friendly. They say that such letters tend to destroy the dignity of the concern that sends them out. This may be true in some cases, but one concern does not think so and it has every reason to believe that the notices it sends out do not offend the customers.

On the contrary, the customers appreciate them. They must, or this concern wouldn't have been able to collect nearly $30,000 worth of outstanding accounts by sending out to customers these notices over a good many years now.

The reason for their success is apparent. They simply put the customer in a pleasant frame of mind at a time when he ordinarily wants to get grouchy. He can't help but smile when he gets one of the cards, and, even if he has the slightest suspicion of a grouch, it leaves as soon as the card gets before him. The collection man quite naturally cashes in on the smile.

This, as well as the rest of the collection plans described, are "human" and accomplish, without any effort, just the thing that every collection manager is constantly striving to do. Appeal to the customer in the most effective and courteous way so that he will pay his bills and not think that he is being "badgered" into it. The main idea back of every collection letter is, of course, to get the money, and get it as quickly as possible; but not at the risk of making an enemy of the customer.

COST ACCOUNTING FOR SALES

By J. J. Berliner

WHAT every aggressive manufacturer and distributor desires to do is to increase his sales so that the full plant capacity will be utilized. The operation of such a sales program not only involves a great deal of expense in the form of salesmen's salaries, expense, cost of advertising and sales promotion, etc., but also for taking care of the overhead incurred in physical distribution. The problem of securing a sufficient volume of sales at a price which will produce a profit for a company is exceedingly great.

The great problem confronting practically every sales manager today is to sell at a profit. There are few concerns which could not increase their sales by increasing their sales expense. But sales are desired only when profits will result.

Sales and Production

Because of the peculiar character of sales expense and the circumstances under which they are incurred, it is very important that they be closely considered and carefully analyzed in order to realize maximum returns from the sales operations. When control is not properly established, this class of expenditures in particular has a tendency to increase unduly. As compared with production, sales activities are largely of an intangible character. In the production end of the business we have physical processes which are repetitive and which are carried on within a limited area of operation. There is only one human factor, the operators of the machines. In selling there are two human factors to deal with, the salesman and the prospective purchasers. The sales department has to deal with intangible factors, as the performance of its main function requires the acceptance of ideas by possible purchasers who are outside of the particular company.

Sales methods are only partially subject to standardization, as they are varied necessarily by conditions of trade and competition. On account of the nature of the work, the field sales organization is scattered and is only periodically under the direct supervision and personal touch of the executive. In general, the services received for the expense incurred by the sales department are of an intangible sort and difficult to appraise. Advertising, for example, is one of those items the direct benefit of which is very difficult to determine. The same is true of expenditures for salesmen's services in sales territories which are in the development stage.

Because of the intangible character of sales activities, sales standards are more difficult to determine than in the plant operations. For example, it is possible to determine the amount of material and labor necessary to produce a certain article and then use this as a standard for estimating the quantity of materials necessary in producing that article. On account of various economic factors there is, however, no exact procedure for determining the amount of selling expense necessary to secure a dollar's worth of sales.

Instead of analyzing and allocating sales costs most concerns lump all their selling costs and consider them as a flat percentage upon the selling price. For instance, the cost of advertising, salesmen's salaries, traveling expenses, and the so-called overhead items, are given lump-sum consideration, i. e., each of these items is expressed as a ratio of the sales price. Such figures are of little value, since the actual profit or loss by territory, by salesmen, and by customers is not shown. In so far as possible a profit should be made on every one of these factors. It may never be possible to reach that goal, but proper analysis of costs will at least reveal which of the above units are profitable and why, not only that, it will show which are unprofitable and why, and thus will point the way to make each stand on its own feet.

If the entire output, for example, is sold to a few large distributors or consumers, the manufacturer's problem of allocating sales costs is not difficult, for then the real burden of sales-cost control falls on the distributors who sell to the retailers or consumers. When such a selling policy is followed it is quite proper to allocate the sales cost as a percentage of the selling price, for it is customary to bill jobbers at the list price less the jobber's discount. The discount to the manufacturer is a selling expense allowed to the distributor for performing a selling function. Obviously when such a method of marketing is followed, the manufacturer needs no elaborate cost system as a basis for effective sales administration. But a great majority of the manufacturers do not limit their policy of selling to large purchasers and jobbers, but sell direct to retailers and consumers, and consequently need a more effective accounting system for the control of sales operations.

Flat Percentage Inadequate as a Measure of Sales Efficiency

For several reasons an average ratio or percentage of selling cost to sales is inadequate as a measure for the effective control of sales costs. In the first place, it fails to indicate the efficiency or profitableness of the salesman or the territory when costs are not allocated to territories. Salesmen taken as a group may be profitable, but at the same time among them some may be consistent losers.

In the second place, it has a tendency to emphasize volume of business at the expense of profits. In other words, it has a tendency to measure sales success by the amount of goods sold rather than on the amount of profit produced. Volume of sales can neither be taken as an absolute measure of successful sales effort nor as a measure of profitableness. For example, customers are not all equally difficult to sell to; an order obtained for $500 does not necessarily involve a sales cost of $50 in case the ratio of the salesman's operating costs to sales happens to be 10% of his sales. A manufacturer selling his products to a national market in competition with other goods will for various reasons find it more difficult to sell in some territories than in others. A salesman may take considerable time to work up a small order which may not be repeated while a large order may be obtained through the mail at the cost of a postage stamp. Then, too, not all lines carry the same margin of profit. The salesman selling $10,000 of merchandise may be more profitable than his competitor whose sales are twice as great.

In the third place, the per cent of cost to sales leaves the sales manager without adequate statistics for appraising the salesman's work in a particular territory. When products of continuous consumption, such as food, clothing, supplies, etc., are sold direct to dealers or large consumers, data pertaining to the profitableness of individual accounts are very helpful in establishing correct sales policies. It is not only important to know to what extent a sales territory is profitable or unprofitable, but in the latter case there should also be evidences pointing out the cause of its barrenness.

Where manufacturers sell to jobbers, as many do, the problem of costing accounts is far less complicated. Unit sales are relatively large and frequent solicitation is not essential. Under this method of distribution the manufacturer usually employs two types of salesmen, the one calling on jobbers in their respective territories, and the other type being those, known as "missionary" salesmen, who solicits orders for the jobbers among dealers. When this method of selling is followed, it is impossible to determine the cost of selling dealers, because the manufacturer does not carry their accounts on his books and has no knowledge of their volume of purchase. It is assumed that the volume of business secured from wide distribution is sufficient to offset the high cost of selling the small accounts in any community.

Need for Sales—Cost Analysis and Reports

The progressive manufacturer understands the necessity of determining accurately the cost of manufacturing the various articles that make up his line. Of no less importance to him is the cost of marketing his products, not merely taking the field as a whole but in detail which salesmen, branches and agencies are making money for him and which are not. In the present-day state of keen competition the cost of selling cannot be ignored.

While it is true that the results of expenditures for advertising and sales promotion cannot be definitely determined, a careful study of these items in relation to the sales program will have the tendency to keep sales costs at a much lower figure and at the same time produce results equally as satisfactory. Reports on sales cost are essential in selecting the right method of selling. On the basis of reports on the salesmen's operating cost, the sales manager will be able to determine (1) whether the salesmen's territories are properly laid out for economical operation, (2) whether they are producing profits in accordance with their possibilities, (3) whether the salesmen are efficient. When sales branches are operated, there should be reports giving similar facts not only with reference to each branch as a whole but also to the territories comprising each branch. Such information is indispensable to sales management as competing firms are very active in making inroads in each other's business. Redistricting of territories and changes in the method of distribution need, therefore, be made from time to time. To direct salesmen most effectively it is necessary to have accurate knowledge of sales cost in every territory.

Cost of Selling by Items

In manufacturing, it is customary to determine the cost of each item so as to develop a manufacturing profit and loss by lines. This procedure cannot be applied very well to selling for several reasons. It is exceedingly difficult to get an accurate measure of the sales effort required to sell each item of an entire line. This would be comparatively simple if the sales force were made up of specialists, each of whom confined his efforts to but one item of product. In practice the salesman sells the entire line; his selling effort to a large extent is measured by the number of calls and sales that he makes and the amount of net profits resulting therefrom. It is not likely that his expense or calls would be reduced if he carried one or two less.

However, the determination of selling cost by items is not so important as it might seem at first thought, for in selling it is essential to consider the purchaser's needs and desires. In some industries it is necessary to furnish the dealers with a complete line even though some items in the line are not profitable. Then, too, the manufacturer with specialized equipment, whose output is limited to certain lines of products, must determine where he can sell at the lowest possible cost what his factory is best equipped to produce. In order

to do this, he should so co-ordinate the sales and production program that the highest aggregate net profit will result. To attain this it may not be practicable to eliminate all items which yield little or no profits. Some of the lines may just be burden carriers, i. e., they may be sold at a price which will probably just pay for the cost of material and overhead. Under such conditions nothing would be gained by dropping these lines so long as they do not produce a "dead" loss to the business.

The profit on the ordinary commodities is essentially an average attained on the unit sale to the customer. Certain costs must then be averaged. While there are a few cases where the cost per item may be desired, in most instances the selling cost develops into a relation to the dollar of sales, i. e., the number of cents it takes to make a dollar sale, expressed in per cent. In those organizations where the advertising activities are general, it is impossible to allocate it to the salesmen's territory on customer's accounts except on an extremely arbitrary basis. Under such conditions, the problem of determining the profitableness of salesmen and territories is simply a matter of allocating direct and indirect expenses.

The direct expenses can very readily be assigned to each salesman. The indirect expenses must be distributed on some basis.

Classification of Selling Expense

The determination of the profitableness of salesmen's territories and customer's accounts on a reasonably accurate basis contemplates a careful classification of the expenses incurred in each salesman's territory. The number and nature of the expense items will depend upon the type of business, i. e., the products it sells, and its policy of sales administration. These expenses ordinarily can be classified under three general headings as follows:

1. Salesmen's Direct Expense—This includes salesmen's salaries, commissions, traveling expense, supplies, etc.

2. Management or General Selling and Office Expenses—The items included under this heading in the home office type of sales organization, where all salesmen travel from the home office under a sales manager, are: Salaries and expenses of the sales manager, his assistant, stenographer, and other office force employees engaged in gathering and maintaining sales data, records; also postage, depreciation on office equipment, telephone, and telegraph, etc.

When the sales organization is decentralized and district branch offices are operated, there is in addition to the cost of maintaining the home office the expense of maintaining the local sales offices. The expense items vary with the functions performed by the branches. The main items included in this heading in a sales branch are manager's salary, rent of office, salary of clerks, postage, stationary and supplies, telegraph and telephone charges; depreciation of office furniture, delivery equipment, etc.

3. Special Advertising—This includes expenditures for special advertising in the sales territories in newspapers, moving picture houses, local newspaper allowances to customers, advertising material, cuts, etc.; distributed to dealers or agents.

Profit and Loss by Territories

The steps involved in determining the profit and loss by territories may be summarized as follows:

1. Credit the territory or salesman with the gross amount of selling profit from his sales produced during a given period.

2. From the gross selling profit deduct the salesman's direct expense.

3. Deduct "special advertising" expense if advertising of this type has been done.

4. Deduct a pro-rate amount of "management or selling overhead."

The salesman's direct expense, salary, commissions, traveling expense, bonus, etc., can be directly allocated to the salesman or the territory in which he operates. The difficult problem arises in connection with the equitable distribution of the selling overhead, that is, the sales office expense. These items cannot be charged directly to the territories but must be allocated on some basis.

There are three methods of apportioning the overhead and they are as follows:

1. On the basis of sales.

2. Equally among the sales territories or salesmen.

3. On the basis of a predetermined sales quota.

Sales Volume as Basis of Apportioning

As the distribution of manufacturing costs on the basis of direct labor usually leads to incorrect results so the apportioning of selling expense on the basis of sales volume gives results equally unsatisfactory. When selling overhead is apportioned on the basis of sales, total sales for the territory of the branch is taken as the basis, and the percentage of overhead assigned to each salesman is the percentage of his sales to total sales, irrespective of the sales total. The more a salesman sells, the greater will be the amount of overhead with which he will be charged.

Selling Overhead Distributed

On the theory that each salesman requires ordinarily about the same amount of supervision and benefits about the same from the efforts of the management, it is argued by some that overhead might for practical purposes be apportioned equally

among the salesmen. If, for example, the overhead amounts to $1,000 for a given month or period, and there are five traveling salesmen, $200 would be charged against each salesman or territory as the proper share of overhead.

The chief argument in favor of this method is that it is easy to administer. In many businesses it will give results sufficiently accurate for practical purposes. In case of new territories which require an undue amount of the sales manager's time, it might be advisable for the manager to keep tab on the amount of time spent in supervising each territory. This can be done by having him make an informal note of the time consumed in directing the activities of each territory.

Pro-rata Methods

The practice of taking sales as a basis for determining expense ratios is very popular among accountants and sales executives. It is easy to understand and no predetermined amounts of expense are required. Both methods are applied at the close of the cost period when the actual sales expenses have been incurred. The clerical labor necessary to make the computations is small.

The principal objection to these methods is that in most cases they fail to reveal the actual status of a territory or salesmen with regard to profit or loss. Take the first method, which provides for the apportioning of overhead on the basis of sales. It is illogical, for if a salesman sells twice his quota, there is no justification for charging him with twice its pro-rata of overhead. The cost of overhead does not increase in proportion to sales, particularly after the quota has been attained.

The territory which is really unprofitable is the one which fails to reach the point necessary to its proper share of the selling overhead. If the overhead in such a territory is apportioned on the basis of sales made therein, the amount it should be charged with is decreased and the lack of its profitableness is obscured. In effect, this method has the tendency to overstate the profit or loss of a poor territory and to understate the profit of a good territory which shows a rapid increase in sales.

As an illustration, suppose that of two territories which are valued approximately equally as to sales possibilities, one produces twice as much sales volume as the other. If the first is charged with twice as much of the overhead, the true performance of the two salesmen will be incorrectly stated. Obviously, according to this procedure, if one of the units sold nothing at all during the period, it would be charged with no overhead.

This can be illustrated by taking a simple example of a company operating in several states with a sales organization of the home office type in which the salesmen are under the direct supervision of the sales manager and travel away from the city where the factory is located. Each salesman has a separate territory which may be a state, several counties, or a portion of a large city. Assume that there are ten salesmen in the organization and that they sell during a given month $60,000 worth of goods, incurring a selling expense of $6,000. Dividing the selling expenses by the sales shows a sales cost of 10%, i. e., the average cost of selling a dollar's worth of goods in each territory is 10% on the sales price.

Suppose the gross selling profit was $20,000. After deducting $6,000, the amount incurred in selling, a net selling profit of $14,000 is left, and an average net profit on the sales in each territory of 23 1-3%.

Now assume that of the $6,000 selling cost, $5,000 was paid for salesmen's commissions and traveling expense, and $1,000 constituted selling overhead. How much of the overhead should be borne by each salesman if the sales of each were as follows:

Total Sales	1	2	3	4	5
$60,000	$4,000	$3,500	$5,000	$4,500	$7,000
	6	7	8	9	10
	$7,500	$8,000	$6,500	$8,000	$6,000

By distributing the overhead of $1,000 on the basis of sales, i. e., the ratio each salesman's sales bears to the total amount, $60,000, the following amounts result:

Total Amount	1	2	3	4	5
$1,000	$66.67	$58.33	$83.33	$116.67	$75.00
	6	7	8	9	10
	$125.00	$133.34	$108.33	$133.33	$100.00

This procedure, though easy to administer, is not a true measure of the relative profitableness of the salesmen. So far as the salesmen are concerned it leaves much to be desired. For example, if the salesmen are paid a bonus on the net selling profit of their territory, in addition to their commissions and salary which is not uncommon in practice, this procedure would have a tendency to penalize the good salesmen and to favor the poorer ones. For example, suppose territories of salesmen No. 1 and No. 7 were both approximately equal as to sales possibilities. Looking at the sales figures, however, we find that No. 7 sold twice as much as No. 1. By distributing overhead on the basis of sales as indicated above, the net operating profit of territory No. 7 is understated while that of No. 1 is overstated. Under this procedure no charge would be made for overhead to a territory in the event that no sales were made during a given period.

Predetermined Sales Quotas

This method is similar to the one discussed in the foregoing except that the overhead is apportioned on the basis of predetermined sales quotas.

Each territory is charged with overhead in the ratio that its quota bears to the total sales quota of the branch, or the entire sales organization if the salesmen operate from the home office. For the purpose of control this method is superior to the method outlined above. In the first place, it presupposes a carefully computed sales quota for each territory. The sales quota then becomes the basis on which the estimated overhead is to be apportioned to each territory. Obviously, allocation on a basis of sales cannot be made until the end of a period and consequently it does not provide figures which are available sufficiently early for the most effective control.

In organizations where fairly scientific sales quotas can be determined this method is probably more equitable than either of the other two outlined, preceding. As already noted, the distribution of overhead on the basis of the sales quota contemplates a fairly accurate territory valuation. This is very important, as little can be done to allocate selling expense on a fairly accurate basis unless there is a reasonably definite estimate of the amount of business a territory should produce.

Costing Customers' Accounts

The foregoing analysis of selling cost makes it possible to get the unit cost of selling individual accounts. The selling expense by accounts can be resolved into three elements as follows:

1. Salesman's cost, which includes the salesman's direct expense and a portion of the management expense.
2. The cost for special advertising.
3. The cost of clerical and warehousing services.

The salesman's cost per call is very desirable. Besides serving as a measure for establishing the profitableness of an account, it may also be used as a unit of selling expense which can be compared with a normal or standard. This affords a splendid check on the salesman's activity. For example, a normal expense call for each territory can be developed as a standard cost. This standard can then be compared with actual performance from month to month. When significant variations occur, proper explanations should be made of the cause. In case the actual cost is higher than the standard, one of two things is evident—either the salesman is making fewer calls, or else he is spending more than normally.

The selling cost per call can be determined by dividing the salesman's cost for a month by the number of calls he made during that period. By adding to this the direct cost of advertising and the cost for the "clerical and warehousing service," the total cost of handling accounts is obtained.

New Record Steel Ingot Production

A new record production of steel ingots for the first six months of a year was established this year, it is revealed by figures compiled by the American Iron and Steel Institute. Production for the period by members reporting to the institute totaled 23,473,901 gross tons, while the estimated output of all companies amounted to 24,792,883 gross tons.

These figures compare with 23,807,387 tons for all companies and 22,537,544 for reporting companies in the first half of last year. The record this year was made in 156 working days, against 155 last year. The approximate daily output of all companies was 158,992 tons, against 153,596, and the per cent of operation 84.31 against 83.47.

The figures also reveal that while open hearth production increased to 20,213,141 tons from 19,226,735 tons, Bessemer production declined from 3,310,809 to 3,260,760 tons. The per cent of operation in June of this year, based on the annual capacity as of December 31, 1927, of 58,627,910 gross tons for Bessemer and open hearth steel ingots, was 76.37 compared with 73.06 in June, 1927.

Production during June was sharply lower than the 82.58 per cent for May, but was a seasonal let-down in activity and is regarded in the industry as a satisfactory showing.

Food Costs Compared

Food is costing the people of the United States less than in many foreign countries, by comparison with prices existing before the war. This is revealed by a study of data of the Federal Reserve Board showing the present level of food prices in various nations.

Food consumed by the average American family now costs approximately 50 per cent more than in 1913, according to the Reserve Board's data. In Holland, the increase is reported as slightly less, averaging 48 per cent. In Canada, it is 49 per cent.

Germany is paying somewhat more for food than the United States. The level there is up 51 per cent. In England the increase is 59 per cent, in Norway it is 60 per cent, in Russia 102 per cent, and in Belgium 109 per cent. In certain other countries, notably France and Italy, the rise is said to be even greater, running as high as 400 per cent.

The prices reported for the United States are based upon a study of the average cost of 43 principal foods in 51 representative cities, in the quantities consumed by the ordinary family. This study is made by the U. S. Labor Department. Foreign data is gathered from official sources in each country, and is said to be based upon similar information.

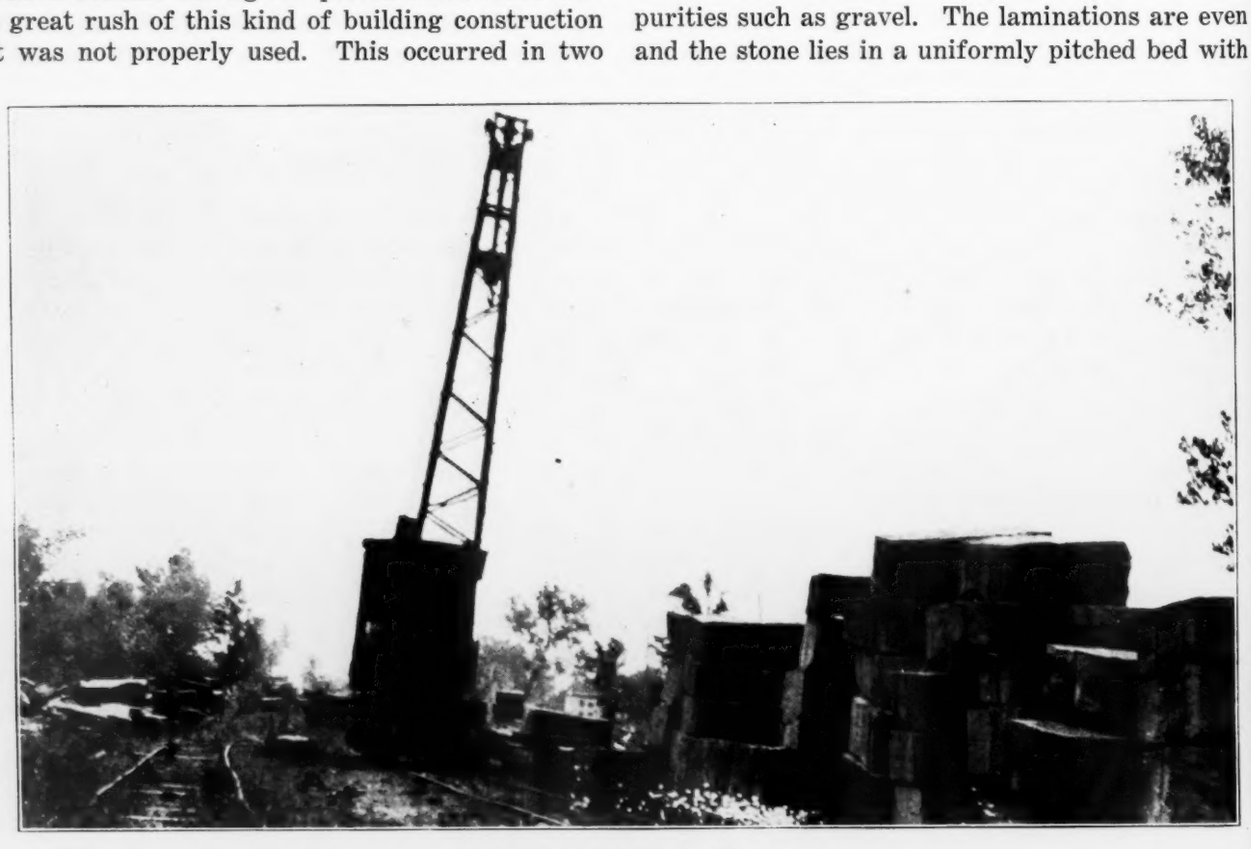
PRODUCTION OF PORTLAND BROWNSTONE RANKS AS ANCIENT INDUSTRY IN U. S.

By F. A. Westbrook

THE brownstone quarries of Portland, Connecticut, must be about the oldest quarries of any description in the country, for they were started about 1660. The quarry shown in the illustration was started about 1690, and possibly includes some of the earlier openings. The stone has been shipped to almost all parts of the United States, some having been sent around Cape Horn to San Francisco. Although the impression exists to a considerable extent at the present time that brownstone does not have good lasting qualities, it appears to be erroneous from the fact that the old Connecticut State House in Hartford, and for which the famous Bulfinch was architect, was erected in 1794, and is still in such a fine state of preservation that many of the original tool marks are visible to this day. The building is now owned by the City of Hartford and used by some of its offices and for civic gatherings. There are also tombstones in the old churchyard in Middletown, Connecticut, made of brownstone and set up in 1689 on which the inscriptions are still plainly legible.

The reasons given by the brownstone producers why in so many cases this material has not lasted well is because during the period when there was a great rush of this kind of building construction it was not properly used. This occurred in two principal ways. The first is that the stone when first taken from the quarry contains a large amount of moisture, known as "quarry sap," which if present in freezing weather causes rapid deterioration. For this reason quarrying operations are suspended in the autumn and the stone must be allowed to season before being used. Consequently there are large storage yards for quarry blocks which are used for cutting building blocks after sufficient lapse of time to permit of due drying out. In the rush of business the stone was used too soon with most unfortunate results. The other reason why brownstone has not lasted well is because it has not been set on its natural bed in the building. It can be split quite easily, which is cheaper than sawing, but if set in any other way than on its natural bed it will scale and flake. Of course, modern methods of sawing have greatly reduced the temptation to split the stone and the architects know now how to specify. It is a significant fact that the demand for this kind of stone for first class residences and buildings of other types is on the increase.

Brownstone is a Triassic sandstone colored by iron oxide. The Portland deposit is free from impurities such as gravel. The laminations are even and the stone lies in a uniformly pitched bed with



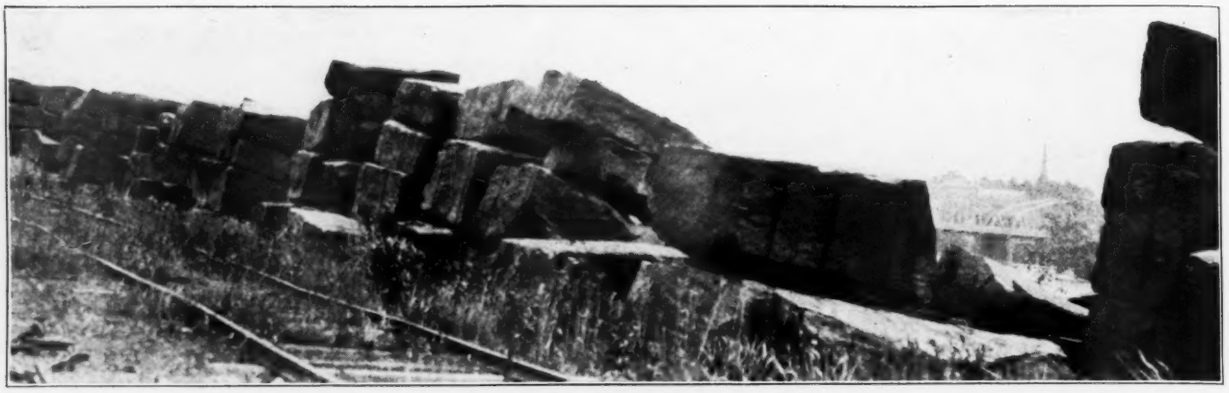
Crane in the Storage Yard

Part of the Outdoor Cutting Yard

natural joints. One of the most interesting things about this brownstone deposit is the fossiliferous tracks of prehistoric animal life. Apparently animals of different sizes, some of them gigantic, lived in the Connecticut valley and left their tracks in the mud, which eventually became brownstone in the lapse of geological ages and with the action of stupendous forces.

At one time, when the construction of the brownstone front house was at the height of its vogue, the production of the Portland quarries was enormous, and Mr. Hall, superintendent of the Portland Brownstone Quarries, tells how, about 1885, before the advent of modern methods, three thousand men were employed here with fifteen hundred yokes of oxen and two thousand horses. The

Planer Making a Moulding



Part of Block Storage Yard

blocks of stone were then moved in sling carts. Originally there were three quarries, which have now come together and form one very large one.

The quarry and mill are situated on the east bank of the Connecticut River opposite Middletown. A siding from the Air Line Division of the New Haven Railroad has been run in and shipments can also be made by water. Formerly water transportation was used to a large extent. At the present time stone is being used from the storage yard and the blocks are handled by a Brownhoist which travels on the railroad tracks. When the stock runs low, quarrying operations are resumed, and it may be necessary to pump out part of the quarry until a workable bench is uncovered, although there is a high spot which is usually above water line. The quarry is something over 200 feet deep, and, of course, if operations on anything like the old scale would be resumed, it would be necessary to pump it dry and keep it so.

The Knox system of drilling is employed. This consists in drilling a series of 2-inch holes broached so as to make notches. A half cartridge of 40 per cent gelatine is placed at the bottom and another at the top with tamping over it. There is nothing but air between the two charges and the compressed air due to the explosion easily splits off the block. Ingersoll-Rand jack hammers are used for drilling. The blocks are then raised by Mundy steam hoists with Roebling wire rope and placed on railroad cars. The tracks extend all around the quarry, so that it is an easy matter to take the blocks to the mill or to the storage yard. A 17-ton Porter locomotive does the hauling.

The mill has been the scene of a great deal of progress in the development of stone cutting machines. In 1888 it had the first saw and in 1889 the first planer, made by Patch and Jackson. There are also four gang saws, made by Shortsleeve and installed in 1884. They saw with chilled iron shot. All of these are still in use, but there are also examples of the most modern machinery. These include a 48-inch circular saw with 25 carborundum teeth, made by the Willard F. Myers Machine Company of Long Island City, N. Y., and a 75-foot Schramm electrically driven air compressor for use with Dallett pneumatic hand tools, which are about to be installed. Individual electric drive is also employed.

The yard where hand work is done in fair weather is covered by a 30-ton traveling crane made by Young and Farrell of Ansonia, Connecticut, and installed many years ago, but still running. In bad winter weather the hand work is done under cover in the shed. A Northampton emery wheel is available for sharpening tools.

Some of the most recent modern buildings which have been made with stone from this quarry are for Trinity College, Travelers' Insurance Company and the Hartford Hospital, in Hartford, Connecticut, and for Wesleyan College, in Middletown, Connecticut; also 420 fireplaces of Nova Scotia greenstone for the Harkness Memorial of Yale.

Traveling Crane in Mill Yard

LOGANSPORT STONE AND LIME COMPANY FINDS MARKET FOR MANY PRODUCTS

By J. O. Durkee

THE PLANT of the Logansport Stone and Lime Company is located four and one half miles east of Logansport, Indiana, on East George Street Road. It is also on the Wabash Railroad and the traction line of the Indiana Service Corporation, which makes connection with other lines extending into Chicago and Indianapolis.

Keeport, the town at which the plant is located, has its name from A. B. Keeport who operated lime kilns on the site more than 40 years ago. The town, which is maintained in a clean and sanitary condition, consists of 24 houses and a store which are the property of the Logansport Stone and Lime Company. The entire property consists of 150 acres of land including the houses, quarry and crushing, lime and hydrating plants. The present plant was originally constructed 13 years ago but has been recently remodeled and is mostly constructed of concrete and steel.

There are three divisions of the plant: the quarry, the crushed stone plant and the lime and hydrating operations, for all of which electric power is furnished by the Indiana Service Corporation. The principal products shipped are chemical, masons, agricultural and finishing lime; fluxing, road, and agricultural pulverized limestone; sewerage filter stone, rip rap and beet sugar stone. The total output of the plants in lime and stone is in excess of 300,000 tons per year.

The Quarry

A condition obtains in the quarry which is of interest to the observer and of considerable value to the operator and permits the wide variation of products as noted in the shipping analysis. It has two banks, or ledges, of stone and has practically no overburden, or cap rock, which makes the operation economical. The top ledge is 18 feet in thickness and is a high calcium limestone, analyzing 98.9 per cent calcium. The lower bank, with little or no interval, is a dolomite stone about 50 feet thick. It has a circular face about 3000 feet long and an average of 56 feet in height is being operated at this time. There is a little water generated in the quarry which is handled by a 4 inch DeLaval pump.

An Armstrong electric well drill is used for primary drilling and the holes which are spaced at 4½ feet apart and 5 feet back from the face are blasted with 60 per cent Trojan dynamite. Second-

Lime Kilns Used by A. B. Keeport, Founder of the Town

ary drilling is done with Ingersoll Rand jackhammers with air supplied by a Worthington air compressor. The secondary holes are blasted with 1 by 8 inch 40 per cent Trojan dynamite. Cordeau Bickford fuse and, in some cases, electric detonators are used. Throughout the season, blasts are made at about three week intervals and each primary blast dislodges approximately 50,000 tons. Each pound of powder yields from 4 to 5½ tons of rock.

Loading the Western dump and individually manufactured cars is done both by hand, on a piece work basis, and with two railroad steam shovels, a Marion with a 2½ yard dipper and a Thew with a 2 yard dipper which is also used, when necessary, for stripping any overburden encountered and removing the interval between the ledges as well as to load run of bank on railroad cars. Before any loading is done, the stone is sorted by hand and identified as to content and arranged to flow in the proper direction for the lime or crushed stone operations.

The steam locomotives, a Vulcan and two Davenports, are used to feed both the crushed stone and lime plant inclines, or skips, as well as to place quarry cars on the track for loading beet sugar stone and rip rap. The quarry tracks and cars are maintained in a safe condition at all times and there is no idle time resulting from inadequate transportation facilities. As the quarry is used as a feeder for so many different purposes, it is necessary for its transportation system to be exceptionally mobile and the means at hand to readily divert the material as required.

The quarry is generally level and a single line of track parallels the lower ledge and from it five other tracks branch. One of these crosses the quarry to another position of the face and the other four tracks converge to a single track which acts as a feeder for the two lines running to the crusher house and a separate track was laid to serve the upper, or high calcium ledge. This rests on the interval between the two deposits. Cars loaded from either ledge may be diverted to either the crushing or lime plant.

Stone for the crushed stone and ground agricultural limestone plant is spotted on a track for that purpose at the foot of the incline which is double tracked. A hoist operated by a 75 h. p. Westinghouse motor through a friction clutch hauls the product on a Roebling wire cable to an automatic tripper over the hopper which is covered by a bar grizzly entering the crushing plant, which is located on the south bank of the quarry.

The stone enters a Number 9 Allis Chalmers gyratory crusher equipped with a 150 h. p. Westinghouse motor for primary crushing. It is taken by a bucket elevator driven by the hoist motor to the top of the building and over a 4 by 5 Deister double decked vibrating screen where the fines from ¾ inch down are taken out for agricultural stone. The bulk of the material passes to a rotary scalping screen unit driven by a 75 h. p. Westinghouse a. c. motor. The screen is made by the American Manganese Steel Company. The screens are 18 feet long by 4 feet in diameter and divided into five sections for grading the stone from 1 to 2½ inches which pass into the different bins, each of 75 ton capacity. During periods of depression, or when certain sizes are not at the time marketable, stockpiles of the different sizes are of necessity maintained. For reclaiming the stockpiles, a Fairbanks steam shovel with a ¾ yard bucket is used.

Sizes which do not pass the rotary screens flow through a chute to a Number 5 Gates reduction crusher driven by a 60 h. p. Wagner motor and pass

Showing Quarry Ledges and Tracks

Close-Up View Showing Character of Ground

into a hopper from which it is returned by a Link Belt bucket elevator to the Deister Concentrator screens and again through the rotary scalping screens.

When insufficient agricultural lime stone is secured through the Deister Concentrator vibrating screens, it is necessary to manufacture the required amount. For this purpose a William hammermill with a 150 h. p. Westinghouse motor, has been added to the crushing plant. The plant is so arranged that stone may be passed through chutes from any of the bins to the hammer mill. This is done to avoid congestion in any of the bins and to have at all times a sufficient quantity of ground limestone to supply agricultural demands.

In addition to the different facilities for rail transportation, the plant is equipped to load trucks which supply demands in the vicinity of Logansport. It is possible to load the class, or quality, required from the bins which is passed over a set of Fairbanks 24 ton wagon scales.

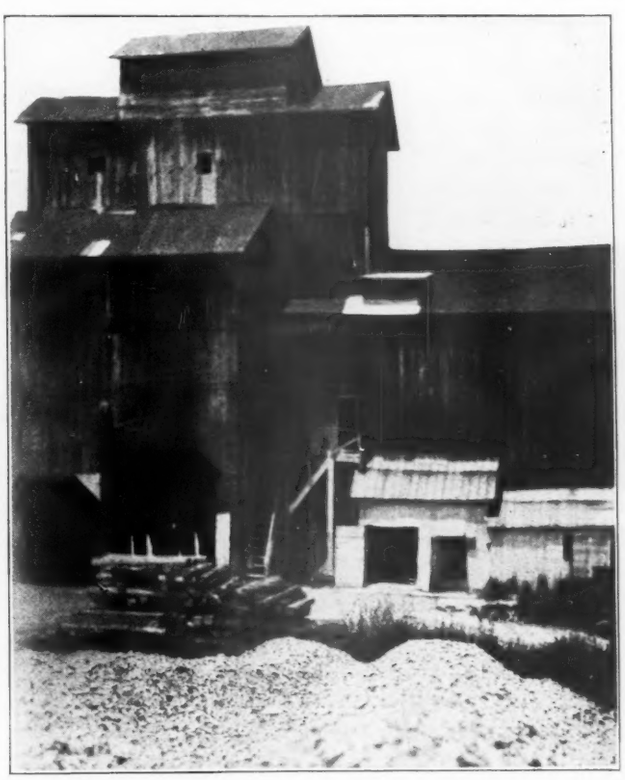
The Lime and Hydrating Plant

For the lime plant, stone is placed by a locomotive on the spur at the bottom of the single tracked incline and hooked on to a Roebling wire cable. It is hoisted with power furnished by an Ingersoll Rand air hoist and dumped into a hopper leading to six circular vertical brick lined lime kilns which are maintained in continuous operation and fired with lump coal of low sulphur content. These six kilns are each 30 feet high by 7 feet inside diameter and lined with Harbison Walker refractory brick. There is no steam permitted under the grates and there is no induced draft. Some of the kilns burn high calcium stone and the others dolomite as required by the demand. Each kiln produces about 230 bushels of lime per 24 hours and consumes about two tons of coal which gives about 5 tons of burned lime per ton of coal.

After the stone is burned for six hours, it is drawn by hand operated shears and falls on a buggy at the bottom of the kilns and is carried to the sorting and cooling floor where it is permitted to cool. It is then hand sorted to separate that which is to be loaded in box cars as bulk for finishing or masons lime, and that which is to be taken by wheel barrows to the hydrating plant. Some of the bulk is worked up in the plant as ground lime by a Sturtevant ring roll mill. It is delivered by wheelbarrows, ground to about 30 mesh and elevated to a small storage bin over a 2 spout Bates valve sacker. All shipments of both ground lime and hydrated lime are made in 50, 75 or 90 pound paper bags.

The lime for hydrating is dumped into a Jeffrey hammermill, driven by a 75 h. p. Westinghouse motor, for crushing. It is then taken by a Link Belt 6 by 8 inch bucket conveyor to a Number 4 Clyde hydrator where, after slacking, it is passed through a Raymond Number 2 mill, driven with the same 75 h. p. Westinghouse motor that operates the slacker.

It is then taken from the grinder hopper by a Link Belt elevator to the Raymond air separator, driven by a 50 h. p. General Electric motor and passes into the bins. From the bins it flows as regulated to a 4 spout Bates valve sacker, operated by a 5 h. p. General Electric motor and is taken by hand and loaded into box cars. The principal



Plant for Crushed Stone and Agriculture Lime

demand for hydrated lime is for chemical high calcium and magnesium lime.

The building which houses the 12 by 12 Worthington air compressor is also used as a machine shop. It has the necessary machinery and tools to care for practically all the needed repairs to the plant as well as building dump cars. Among the equipment are a 2 ton Curtis air hoist, an electric drill press, a lathe and the DeLaval pump, driven by a 20 h. p. Westinghouse motor, which is used for dewatering the quarry.

The main office of the Logansport Lime and Stone Company is at Huntington, Indiana. Peter Martin, who has been operating in the lime industry for more than 45 years, is president; Theodore Torborg is treasurer and general manager; Matthias Martin, superintendent, and John M. Martin is assistant superintendent.

World Water Power Resources Compared

Water power resources of the United States are the greatest of any nation in the world. Approximately 36,000,000 horsepower of potential energy available in the rivers and streams of the country, the U. S. Geological Survey estimates. India is shown to have 27,000,000 horsepower, Brazil 25,000,000 horsepower, China 20,000,000 horsepower, Canada 18,250,000 horsepower, and Russia 13,425,000 horsepower.

The United States is also far in the lead in developed waterpower. Plants in the country have a total capacity of 11,700,000 horsepower, according to the latest figures, or approximately as much as all of Europe combined. The developed power of the world is set at 33,000,000 horsepower.

Seventy-five per cent of all waterpower development in the past three years has taken place in the United States and Canada, the Survey states. At the present rate of increase, it is claimed, the United States will surpass Europe by a considerable margin in three years more.

Demand for Motor Oils Increases

Demand for motor oils and other lubricants in the United States is at a new high level this year, it is shown by a study of U. S. Commerce Department data.

Approximately 78,635,000 gallons of oil are being petroleum report. Last year 71,116,000 gallons were used. In 1926 the average was 74,633,000 used monthly according to the Department's latest gallons; in 1925 it was 66,673,000 gallons; and in 1924 it was 61,132,000 gallons.

Daily consumption for the year averages 2,600,000 gallons compared with 2,300,000 gallons a year ago. Current demand has risen to over 3,300,000 gallons a day, however, it is indicated.

Production is proceeding at the rate of 118,828,000 gallons monthly. In 1927, output was 107,982,000 gallons per month. Oil stocks on hand are shown as aproximately 336,856,000 gallons.

Estimates place the average use of oil by motorists at 1 gallon to each 20 gallons of gasoline burned. On that basis, automobile consumption of oil totals about 50,000,000 gallons monthly. This represents an average allowance of a little over 2 gallons each for the 23,127,315 machines in the country.

Apartment Construction Increases

Popularity of apartments in cities of the United States shows a marked increase in the past six years, chiefly at the expense of the individual home.

The extent of this trend is set forth by the U. S. Labor Department in a study of building permits issued during that period. Of 377,305 city families provided for by new construction in 1922, approximately 48 per cent were housed in single dwellings, while apartments accommodated 31 per cent. In 1927 the ratio of single dwellings dropped to 38 per cent or a loss of 10 per cent. Apartments the same year increased to 48 per cent, a 17 per cent gain.

Over the six years, however, the advantage remains with the home. Forty-four per cent of all new shelter provided in that time was of the one-family type. Apartments contributed 38 per cent. The remaining 18 per cent consisted of two-family dwellings.

Separate homes to accommodate a total of 1,167,559 families were constructed from 1922 to 1927, it is shown. Apartments took care of 989,491 families in that time. Double dwellings housing 476,378 families were built.

Germany's Building Activity in 1927

Official figures concerning the building activity in Germany during 1927, which have recently been released, show a considerable increase over the figures of preceding years, according to Trade Commissioner James E. Willis, Berlin. Altogether 288,635 apartments or single dwelling houses were placed at the disposal of the German people during the year. This exceeds the total number of apartments and single dwellings built in 1926 by 82,842, or 40 per cent. The number of new buildings of all kinds completed in 1927 amounted to 188,423, of which 120,613 were for residence purposes exclusively. The number of dwellings completed in 1927 showed an increase of 35 per cent over the previous year, which, in comparison with the increase of the total number of apartments and single dwellings, indicates a tendency toward larger apartment buildings.

KEEPING TABS ON PAYMENTS FROM CUSTOMERS

EVERY concern selling on credit is confronted with delinquent customers on its books, and unless complete records are kept containing information about everyone who owes money and a system of following up payments maintained, many accounts will become bad debts and in addition, a large amount of money will be tied up unnecessarily.

However, in devising a method of collecting accounts, it would be dead wrong to treat all customers alike for the simple reason that all customers are not alike. Sometimes a good paying customer for some good reason may occasionally lag behind in his payments. Others may pay promptly until the slack season rolls around when it is difficult to make payment on the date required. Then there is, of course, always the chronic slow payer. Accordingly, in any follow-up system for collecting accounts there should be some means of determining quickly and accurately to what class each customer belongs.

Each class of customers requires individual attention often, lack of discrimination as to the important personal characteristics of customers, and the peculiar circumstances to which each business is subject, will lose valuable trade.

In order to handle all customers' accounts properly and without giving offense by too urgent pressure, a card system is used by one concern. To avoid the trouble of wading through a large number of statements at the end of each month, clerks check on the ledger cards (see form) all accounts past due, or where the amount due exceeds the credit limit.

To each delinquent customer a letter is sent especially adapted to the needs of each case. When a customer is written to for the first time, the name and address is entered on a small card (Form 3) to be filed for the follow-up. On this card the nature of the contents of the letter, the date sent out, and the follow-up date appear. If no remittance is made, the next follow-up letter contains a more urgent request for settlement.

Personal Letters Bring Highest Returns

When it comes to reminding customers of past due accounts, the personal letter brings the highest returns. Although rubber stamped statements and printed slips attached to the bottom of the statement are used quite frequently, when it comes to drawing money from chronic slow payers they are ineffectual and inefficient. The temptation to tear off the printed slip or disregard the stamped reminder is too great. Usually the statement is laid aside and forgotten. The personal letter, however, with its special consideration, costs more, yet is more economical. The preparation of these letters is greatly simplified by the use of a standard form for each class of accounts, the card record showing which kind of letter should be sent at any given time.

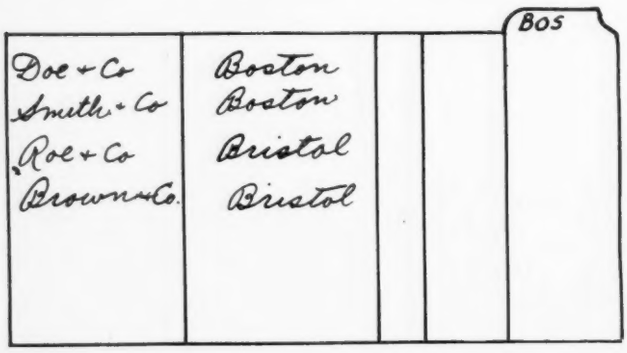
Only a few letters need be individually written, and always the nature and date of these are entered on the customers' card to avoid repetition

NAME Brown Bros. 50 Peat St. TERMS 2 % 30 Days No. 241

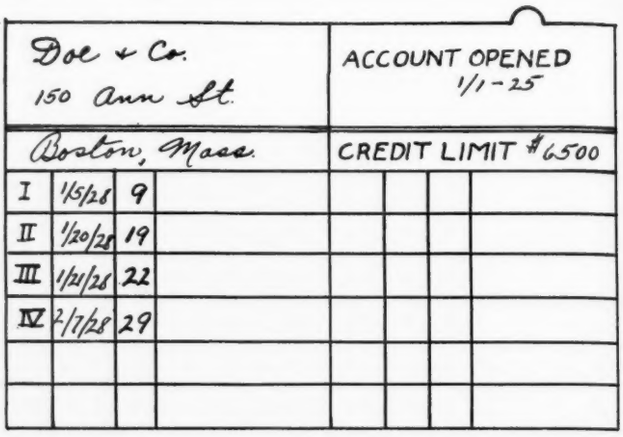
ADDRESS Bristol Cash Day Last Tuesday. Limit $4000

DATE	FOLIO	PARTICULARS	DR.	CR.	DATE	PARTICULARS	FOLIO	DR.	CR.
11/23	186	M'dse	54 00						
11/30	417	"	32 00						
12/10		Check		84 28					
		Disc		1 72					

FORM 3 LEDGER CARD



FORM 2



FORM 1

of the same kind of letter to the same customer. The date of the last letter is always entered on the ledger card with the follow-up date. For example, if in going through statements, it is found that a certain customer was written to on April 9, and the follow-up date is April 19, the statement is dropped in the tickler among the April 19 cards, and is then followed up in the usual way.

As accounts are paid off, the customers' cards are transferred to and filed alphabetically in a record cabinet. To illustrate: by referring to the customer card it might be seen that a customer was last written on April 29, and the follow-up was filed for June 10. On June 6, however, the account was paid; the follow-up card would then be transferred to its proper place in the record cabinet. In subsequent dealings such a record is valuable because it shows definitely just how strongly the customer had to be written on previous occasions.

This record cabinet is made up in exactly the same order as the card ledger. This allows immediate reference. Guide cards are shown in Form 2, but it is not necessary to index these, as the numbers run the same as on the ledger cards. There is one advantage, however, in indexing the cabinet: in passing orders it avoids the inconvenience of opening up a closed cabinet where the ledger cards may have been filed away.

History of Account Instantly Available

The advantage gained by such a system is that it enables one to see at a glance just how any account has been handled in the past—what letters were sent, their results and dates. Suppose for instance that John Doe & Co., after an interval begin to pay up regularly, but at the end of another twelve months get behind again so that it becomes necessary to write them. The record cabinet will show whether or not this company has been written to before, and just how difficult was the collection—how many letters were required for satisfactory results. It was suggested that some concerns are slack in payment at certain times of the year. Some concerns, for example, are likely to do the bulk of business during the spring and summer months, while during autumn and winter business is quiet and ready cash dwindles. The cards would tell the story. On the John Roe account, we find by referring to the cabinet, he was unable to pay his account, when due at the end of February last year, but promised to remit early in April when his busy season began. His account was paid on April 10 and his promptness continued throughout the entire spring and summer. All such facts should be considered in pressing for payment. A flexible follow-up record of overdue accounts, similar to the one here described, is, perhaps, the most convenient method of keeping such facts constantly accessible.

The Basis of a "Flexible Policy"

From the standpoint of credit, this method of keeping tab on the payments of customers is a good basis for the "flexible policy" in dealing with customers. That is a policy that does not treat all customers alike with respect to credit, service, "drumming" and so forth. Such a policy is found to be necessary in certain lines of business often, when making a contract, such a record may become an important consideration. This record, together with the follow-up data, may be depended on to indicate the desirability of the account and, therefore, to indicate the amount of "drumming" it should receive. But the main value of this system is that the urgency and date of the follow-up may vary individually.

Cement with High Initial Strength

A cement with high initial strength is obtained by burning a cement slip having a lime content equal to that of Portland cement slip and whose silica content in the burned cement clinker is lowered until the silicate modulus is less than 1.65, while the iron oxide content is made very nearly equal to that of the alumina.—Hans Kühl (German Patent 457, 621.)

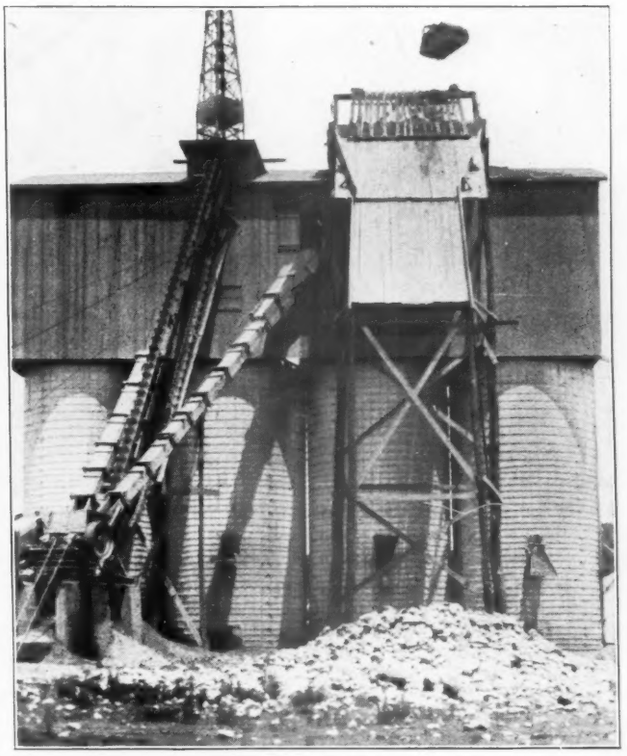
SIMPLICITY MADE A PARAMOUNT FACTOR BY GREGG GRAVEL COMPANY

CAMDEN, Ohio is located near the extreme boundary between Ohio and Indiana on the Pennsylvania Railroad. Until recently there were no sand and gravel operations in the community until the Gregg Brothers, who were of long experience in the industry formed the Gregg Gravel Company, purchased a tract of land just east of the municipality and began operations.

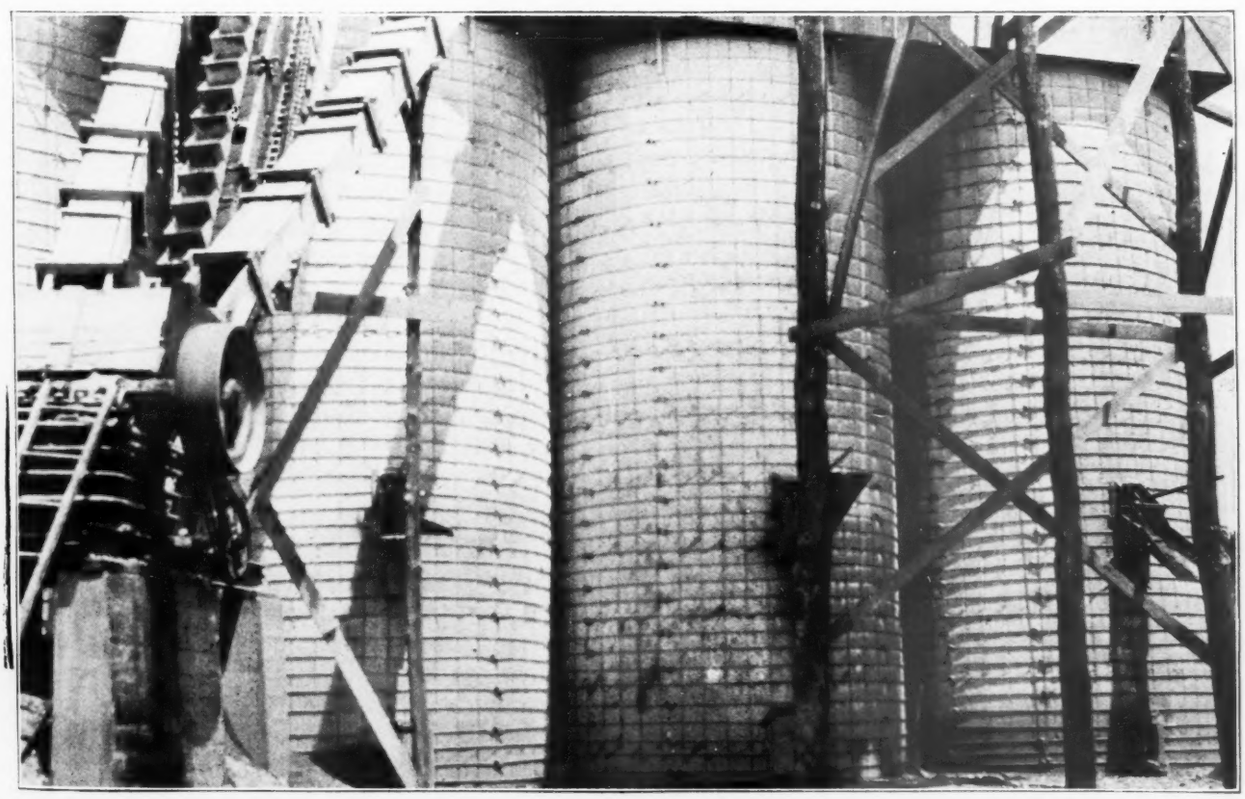
Production at the plant began about May 15 and has been continuous since that time. As is necessary in most new developments, there was a limited experimental stage to make adjustments. In a short period, production had mounted to capacity and one is impressed that the places filled by men and machinery have the appearance of having been fixtures for some time. Each employe has his full measure of responsibility and each machine has its units of labor to perform to make the Gregg plant one of the most efficient and compact plants in operation.

Much of the counsel and engineering work on the design and construction of the plant were supplied by Sauerman Brothers of Chicago, and the buildings were designed and constructed by Jeffries and Fudge. Most of the equipment was purchased through the Queen City Supply Company of Cincinnati.

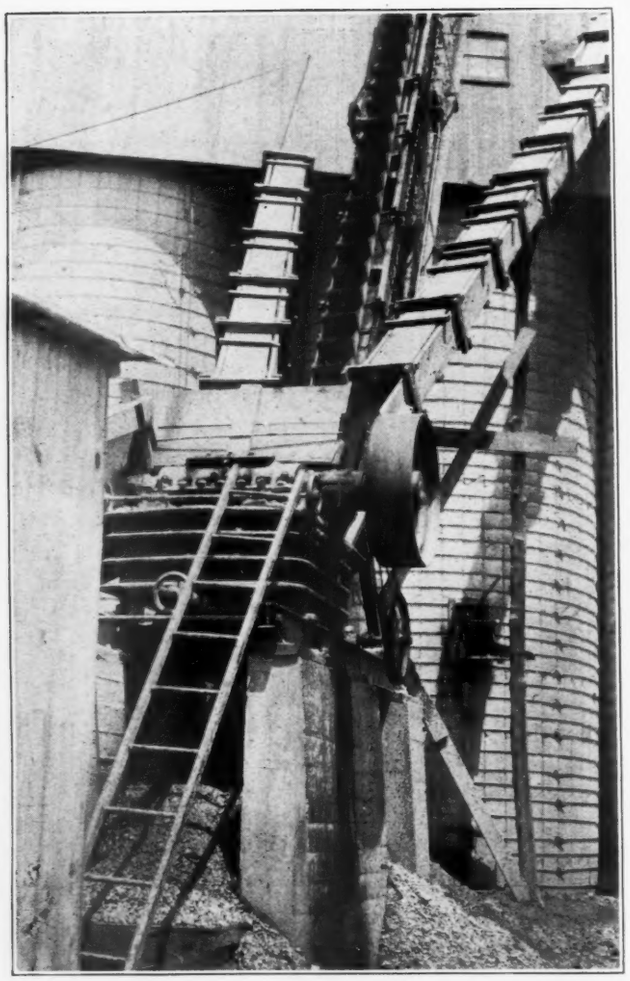
The deposit of sand and gravel is apparently rather uniform over the entire property and evidently runs high in better quality aggregate as well as a sand which has a demand in and about the Camden municipality. The uniformity of the struc-



View of the Plant, Mast and Bucket



View of Bins with Gravity Gates



Showing Crusher and Elevator

ture would indicate that the deposit resulted from inundation rather than from glacial action.

Material is excavated by a ¾ yard Sauerman bucket attached to a Sauerman cableway excavator, having a 700 foot slackline. It is operated by a Thomas hoist driven by a 60 h. p. General Electric squirrel cage 220 volt a. c. motor. Material is dumped from the bucket onto a bar grizzly and passes into a hopper from which it is fed into a Morrow screening unit. The first five feet of the unit is a scrubbing arrangement and a part of the rotary screen. With the material a 4 inch stream of water is combined. This is taken from a well by a McGowan horizontal pump which is driven by a 25 h. p. Imperial a. c. motor.

With the scrubbing operation completed, the washed material passes into the other portion of the Morrow unit, a double jacket rotary sand and gravel screen. In this operation sand from ⅛ to ⅜ and gravel from ¾ to 1½ inch are taken and pass through chutes to the respective bins.

Tailings, or oversizes, pass from the rotary screen through a chute into a hopper directly over a belt driven Universal 8 by 36 inch jaw crusher, operated by a 40 h. p. Imperial a. c. motor. After crushing, it passes into the hopper under the jaw crusher and is taken by a Universal bucket conveyor over a gravity screen to the main screening and washing unit where it is sized and passed into its respective bins.

Bins into which the material passes after refining are four in number and are 14 feet in diameter and 30 feet high. They were manufactured and erected by Neff and Fry of Camden and are equipped with the special Neff and Fry gravity gates. These bins are constructed of super concrete staves, reinforced with round steel hoops and may be extended or taken down and reassembled as required.

Only four men are required to operate the plant as all parts of the plant are functioning to give increased production with a minimum of labor. All the material is being taken by trucks in the vicinity of Camden and much of it is at present being used in the manufacture of bins.

Cement Industry Sets Safety Record

Reducing lost time accidents by 20 per cent the portland cement industry finished its June No-Accident drive with 47 mishaps and only one fatality. For a similar period last year 59 accidents were reported with one fatality. During June, 1926, 198 lost time accidents were suffered by the industry with six fatalities.

These results are even more important when it is taken into consideration more men were employed and more plants in operation during the past month than in June, 1927. Last year 145 complete plants entered the June drive against accidents, during this June 162 plants fought to eliminate personal injury mishaps. Twenty per cent less accidents were recorded with 11 per cent more mills reporting.

One hundred and thirty-eight safety banners out of the 162 hoisted on the plant flag poles are still flying. These flags were presented to the plants by the Portland Cement Association with the understanding that they were to fly as long as no lost time accidents occurred. In case of an accident the mill flag was sent back to the Association with an explanation of the mishap that caused its loss. Only 24 mills lost their flags during the entire 30 day period.

Nearly 50,000 cement workers participated in the June No-Accident Drive. Each man signed a card pledging himself to be careful during the month and to protect and help others. Not only did the workers pledge against accidents but every foreman, superintendent and executive enrolled in the campaign. So much interest was aroused by this year's drive that the mill employes have already started a drive during July to beat the June record.

FLUORSPAR ORE FLOTATION FOR ACID SPAR

By Will H. Coghill and O. W. Greeman

SUPPLIES of gravel spar and of acid spar are not well balanced. Gravel spar—85 per cent fluorspar, 5 per cent silica—gluts the market, whereas acid spar—98 per cent fluorspar, 1 per cent silica—is somewhat scarce. Hence it is desirable to convert some of the gravel spar into acid spar. Knowledge of this condition prompted the Franklin Fluorspar Company at Paducah, Kentucky, to enter into cooperation with the U. S. Bureau of Mines and the Missouri School of Mines and Metallurgy to improve the methods of fluorspar milling so that more acid spar would be available. The fluorspar company detailed Mr. Omar Greeman for the work. During the course of the investigation, while Mr. Greeman was also doing work for a master's degree in the School of Mines, an extensive study was made of gravity concentration of fluorspar ores. Decrepitation by heat treatment was also given a laboratory tryout. A part of the time was spent on flotation; these notes relate only to the flotation.

The results of one of the flotation runs is appended. The test was made in a 500-gram mechanical-agitation machine. The sample was ground to 100-mesh in a pebble mill.

The reagents used were as follows:

Reagent	Pounds per ton
Oleic acid	1.0
Sodium oleate	0.1
Sodium silicate	0.2
Sodium carbonate	0.2
Heavy crude pine oil	0.2
Steam-distilled pine oil	0.1

The feed sample had a tenor of 67.94 per cent CaF_2, 27.90 per cent SiO_2, and 1.73 per cent $CaCO_3$. The high spar content, which yields a low ratio of concentration, makes fluorspar ore unlike lead, zinc, and copper ores, from which only a small amount of material has to be floated. Flotation is at its best when the amount of the economical mineral is small. However, froth flotation of amenable fluorspar ores is justified. The concentration of fluorspar with a high mineral content probably may be more easily visualized by the coal-washing engineer or the man interested in iron-ore concentrations; they centralize their efforts upon the gangue which has to be removed. Fluorspar contains 27.90 per cent SiO_2, which has to be reduced to 1 per cent. In the runs only 1.21 per cent of the SiO_2 went into the concentrate with the spar, giving it a tenor of only 0.60 per cent SiO_2. The calcite was somewhat troublesome, and 18.47 per cent of it floated. Since the middling was of about the same grade as the feed, it was treated separately as a new feed and yielded products similar to those made from fresh ore. Hence the tailing and concentrate shown in the table may be taken as fairly representative of the finished output from a commercial plant.

Calcite was found to be more floatable than the silica. This statement may be expanded into a broad generalization which is important in judging new bodies of fluorspar: From the standpoint of physical deportment, calcite is more troublesome than quartz in all the commercial processes—gravity concentration, decrepitation, and flotation. It is fortunate, therefore, that the industry does not exact penalties on calcite as it does on silica. The R_2O_3 shown in the table was mainly oxides of iron; elimination of these oxides was satisfactory.

These notes are not intended to convey the idea that all siliceous fluorspar ores will yield acid by flotation; far from it. The particular sample under discussion was selected after an extensive examination to determine dissemination of silica in the ores. The sample was chosen because the silica was not too badly disseminated. When the silica has to be reduced to 1 per cent, the grinding must give almost perfect liberation. In the early work on fluorspar when 5 per cent silica was allowable, the ores were regarded as well liberated; but when a 1 per cent silica product was sought, the point of view had to be changed. Some fluorspar ores are badly disseminated even at 100 mesh, and only a small percentage of the available spar can be recovered as acid grade by flotation.

The flotation reagents required in the tests were oleic acid, sodium oleate, sodium silicate, sodium carbonate, heavy crude pine oil, and steam-distilled pine oil. The estimated quantities have been shown above. The use of soap (sodium

Product	Weight per cent	Assay, CaF_2, per cent	Distribution of CaF_2	Assay, SiO_2, per cent	Distribution of SiO_2	Assay, $CaCO_3$ per cent	Distribution of $CaCO_3$	Assay, R_2O_3, per cent	Distribution of R_2O_3
Concentrate	56.0	98.23	81.07	.60	1.21	.57	18.47	.60	13.83
Middling	17.8	61.69	16.12	33.24	21.16	1.93	19.81	3.14	22.92
Tailing	26.2	7.29	2.81	82.75	77.53	4.08	61.72	5.88	63.25
Composite	100.0	67.94	100.00	27.90	100.00	1.73	100.00	2.43	100.00

oleate) seems to be required. Of course the soap can not be used in hard water. In some localities a water-softening plant would be a prerequisite. The water used in the above-mentioned tests was distilled.

Some ores will yield acid spar more readily if the flotation is preceded by gravity concentration. Gravity concentration would remove some of the accessory minerals, such as galena, barite, and blende. Of course, gravity concentration would incur a loss of spar, but losses are of secondary importance when acid spar is sought.

The market should be assured of a long-time contract before any more fluorspar prospects are developed. The industry is suffering from oversupply due to increase of importations. The large stock piles of gravel spar and the intermittently-running mills in the Illinois-Kentucky field give evidence of this. As stated above, conversion of some of the gravel spar into acid spar by flotation would bring about a balance that would give a healthier tone to the markets.

A New Remarkable Highway

The Du Pont Magazine in the July issue has an article by T. M. Garrett, entitled "The Oversea Highway," which is a description of the work being done on the highway connecting Key West to the Florida mainland, forming the southernmost link of the Dixie Highway. An abstract of this article follows.

This highway, which stretches across the Florida keys and runs parallel to the "Oversea Railroad" for most of its length, crossing it only twice, is one of the most remarkable roadbuilding projects ever undertaken in the United States. It is 130 miles long and connects 18 small islands, the largest of these being about 28 miles long and the smallest about 1¼ miles. The Atlantic Ocean bounds the islands on one side and the Gulf of Mexico on the other and in many places they are so narrow that both of these bodies of water can be clearly seen from the highway. Fills and bridges carry the road over the water between the islands.

The keys are coral islands, very few of them being more than three feet above sea level, and at high water some of them are submerged to a depth of 6 to 12 inches. The coral rock is of limestone formation, containing from 70 to 90 per cent lime, and varies greatly in hardness. These islands are covered with vegetation, in some places so thick as to be almost impenetrable. Some the finest limes in the world are raised on the keys and cocoanut palms flourish and bear profusely.

The road itself is of the oil-penetration type and is built on solid rock with a 12 inch coral rock base and a 4 inch top course, both of which were obtained by blasting along the right of way. It is 16 feet wide and has 4 foot shoulders. The bridges already built are of wood and are the four pile standard trestle type. They are built at least five feet above high water and are from 60 to 6500 feet long. The piles are driven in from four to five feet and are almost impossible to pull out due to the peculiar gripping action of the coral rock.

The completed highway will include 105 miles of road and 26 miles of bridges. 80 miles of road and 7 miles of bridges have actually been completed, leaving a gap of about 40 miles between No Name Key and lower Metacumbe Key. This gap has been closed temporarily by ferry service, the two large boats now in operation being entirely adequate. As soon as the money is available, the gap will be permanently closed by constructing 22 miles of road and 18 miles of bridges, one of them alone being 14 miles long.

The project, except for a few miles in Dade County, was financed by Monroe County without state or Federal aid. Completion of the highway, however, will probably be made with state and Federal aid. Approximately sixteen million dollars have already been spent and about as much more will be needed.

The formal opening was on January 25, 1928, when the ferry service was put in operation. The highway connects at Key West with a six mile boulevard encircling the eastern portion of the island; and by a six hour ride on steamers fully equipped to handle automobiles, more than 700 miles of paved road in Cuba are available.

The principal contractors were: Jenner Brothers Construction Company, Davenport, Iowa; S. J. Groves and Sons Company, Minneapolis, Minnesota; and the Tidewater Construction Company, Key West, Forida, succeeded by the Key West Construction Company. A larger variety of equipment was required than was probably ever used on any other single highway project in this country. These included gas shovels, draglines, pile drivers, dredges, motor trucks, winches, hoists, drilling outfits, motor launches, barges, scrapers, graders, and many other smaller items. Approximately half a million pounds of Du Pont dynamite was used in blasting the coral rock. J. N. Watkins was chief engineer of the project and Clifton G. Bailey, assistant.

Portland Cement

The raw is made up of calcium carbonate, (limestone, chalk, etc.) and of prepared crystalline silica (sand, quartz, sandstone, flintstone, etc.) as well as a small percent of a metallic oxide. It is mixed, worked up, burnt and ground in the usual manner. The product is a standard Portland cement composed almost entirely of calcium silicate.—Gerto Snijder (Holland) (German Patent 457, 116.)

STONY CREEK GRAVEL COMPANY PRODUCES WITH FIVE MEN 600 TONS DAILY

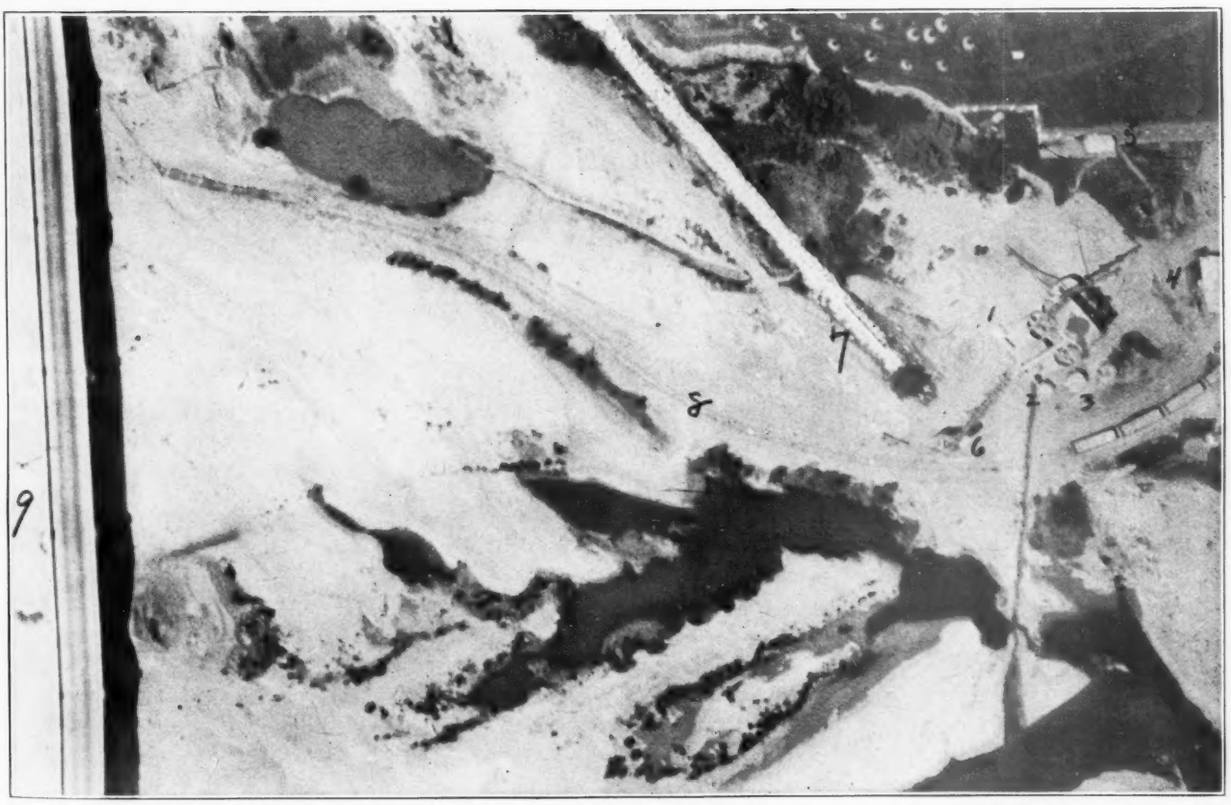
THE SAND, gravel and crushed stone plant of the Stony Creek Gravel Company is located 1.6 miles north of Orland, California, on the Southern Pacific Railroad. It is owned and operated by Mr. Twede, who is general manager of operations, and H. E. Smith, sales manager for the company. At present, the plant is producing 600 tons per day with five men.

The plant and railroad siding, sufficient to accommodate 12 cars, are located on the north bank of Stony Creek and the material is taken from the south bank of the stream, a distance of 900 feet, by a Sauerman slackline excavator with a one yard bucket. The material, as taken by the bucket, ranges from 10 inch boulders to sand and gravel. The deposit is from 6 to 35 feet and averages about 20 feet with little covering or over-burden.

The bucket is hauled across the stream on the line and dumped into a hopper which is 85 feet high, completely spans the top of the bins and has a capacity of 180 tons. The large hopper equalizes the screening, washing and crushing operations, by preventing delays from minor breakdowns and enables the plant to operate almost the entire season without leaning the mast to compensate for tailline moves. Prior to the construction of this hopper it was necessary to lean or move the mast after every second move of the tailline.

From the hopper, the material is taken by a Bodinson reciprocating feeder to the 3 inch scalping screens, designed and installed by the Bodinson Manufacturing Company, which designed and installed all of the washing, crushing and screening machinery. The rejects from the scalping screen pass to a bunker designed for the purpose to be fed to a 9 by 18 primary jaw crusher, while the material which passes through the scalping screen and goes to a screen with one inch mesh. The rejects from the one inch screen, or from three to over one inch, pass to a 1½ inch mesh screen to be rescreened and rewashed and the rejects pass to another specially designed bunker and are fed to a Telsmith reduction crusher as required.

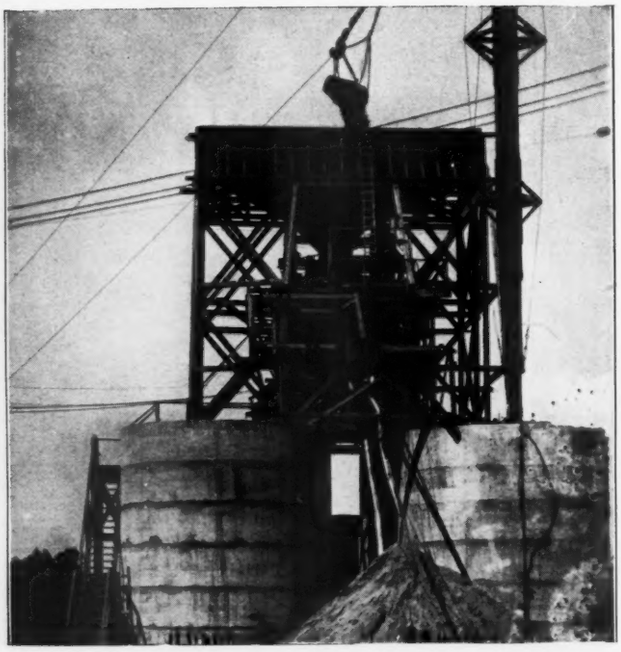
After the material is washed, screened and crushed to the desired sizes, it passes into the respective bins on the railroad tracks, to await disposal. There are six bins, for the finished material, in two rows and each is 20 feet in diameter, and one row is 30 feet high while the other three are each 35 feet in height. These bins are connected with a loading conveyor with 174 foot centers. One row of the bins is filled with crushed



1—Primary Crusher. 2—Reduction Crusher. 3—Pump House. 4—Hoist House. 5—Warehouse. 6—Loading Hopper. 7—Jetty For Flood Protection. 8—Apron Track. 9—Stony Creek Bridge

Aerial View of Stony Creek Plant

and Surrounding Territory



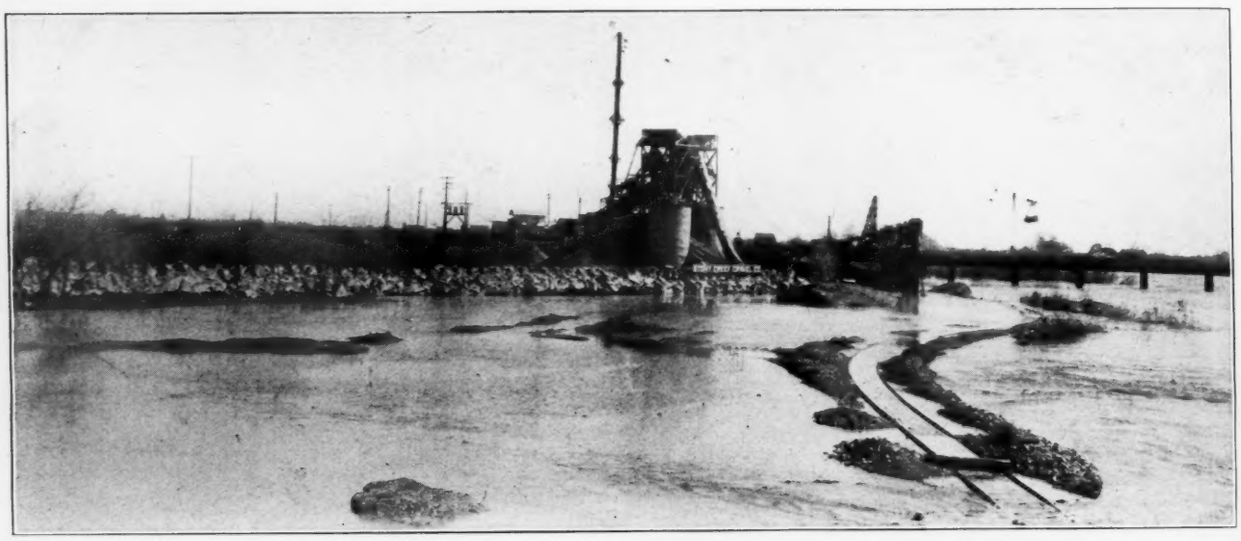
Close-Up of Plant

stone while the other row contains washed and sized gravel and the conveyor belt simplifies the proportioning of the product to any desired mixture.

In addition to the care exercised in washing and sizing, the gravel and crushed stone are washed after loading in cars. The cars are dropped by gravity, under the loading hopper and are set on the loaded siding by a car puller which places two cars at one time.

As indicated in the article the plant is operated entirely by electricity and, as expansion has been the custom of the Stony Creek Gravel Company, new additions to the plant are contemplated. Among the first will be a storage plant and considerable additional side track facilities, which will necessitate the installation of a locomotive crane.

When these additions and refinements are completed, the plant of the Story Creek Gravel Company will increase its production and become one of the most modern operations.



This Is What Brings In the New Material Each Year

Starting the New Cut

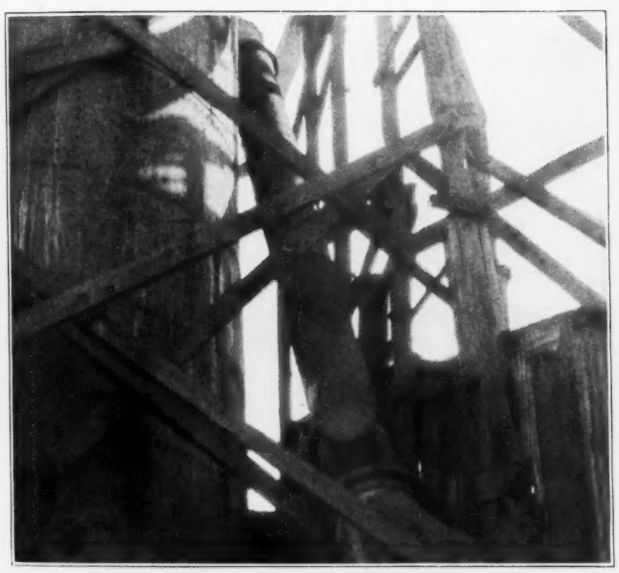
CONNECTICUT LIME MAKES IMPROVEMENTS

THE Connecticut Lime Company, of Canaan, Conn., has installed pulverizing equipment at one end of the floor where lime is drawn from the kilns to meet the demand for pulverized unslaked lime.

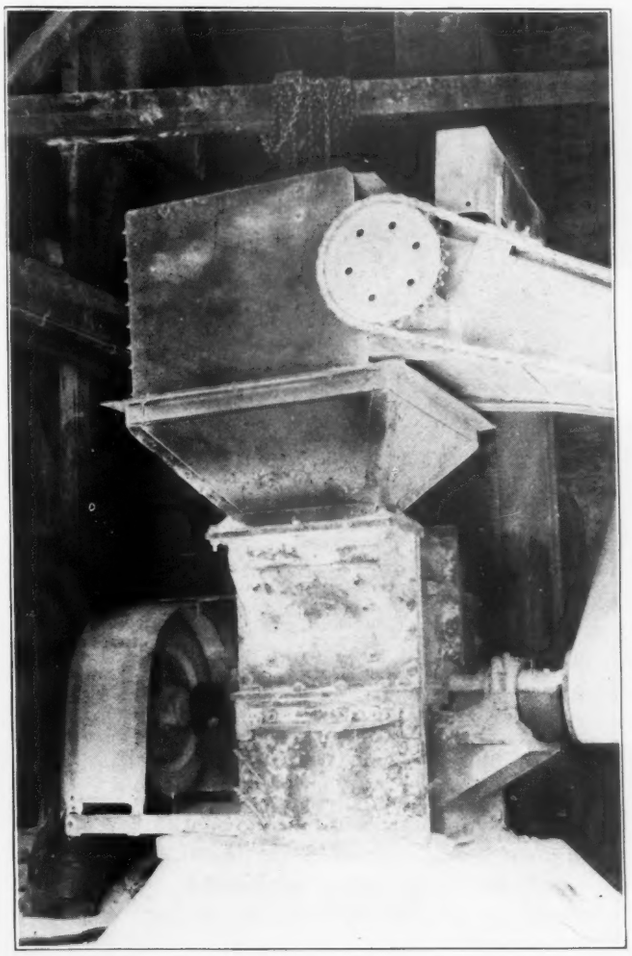
Lime is brought from the kilns in push carts or wheelbarrows and dumped into a hopper set below the floor. From this the lime is carried by a pan conveyor to the hopper over the K B pulverizer. After grinding, the material is raised by an elevator passing up through the roof whence it descends through a spout to a bin over the Bates packer.

All of the machinery is electrically operated by General Electric motors. It will be noted from the illustrations that the wiring has been installed in conduit in a very safe and workmanlike manner and that the motor control equipment has been mounted on posts in the most convenient locations.

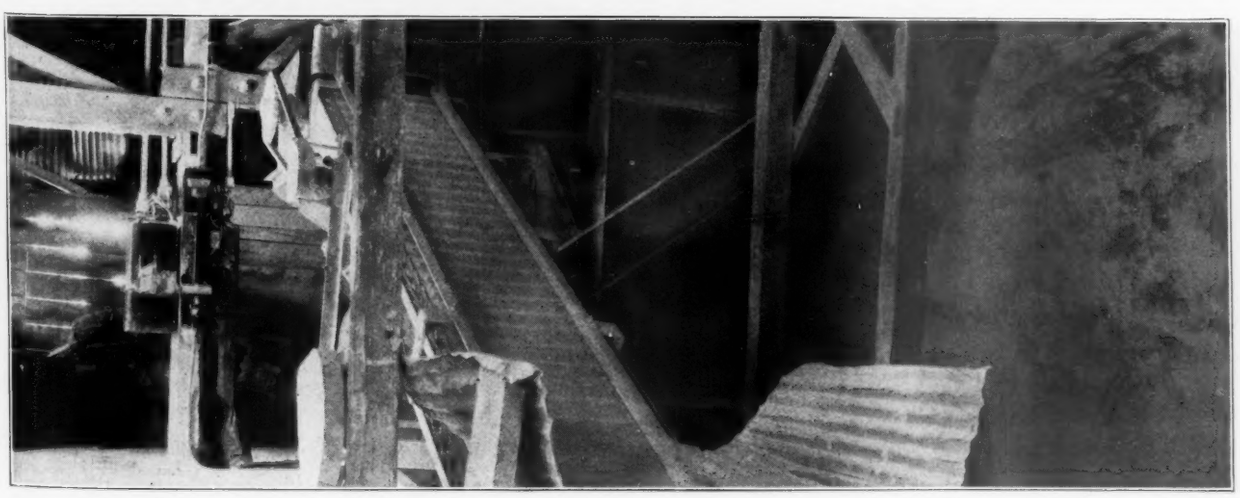
The capacity of this installation is about 100 bags of lime per hour and while the present demand does not yet call for full time production at this rate there is good reason to expect it will do so before long. The whole operation is carried on on what is practically the loading platform so that it is a simple matter to load the bagged lime directly



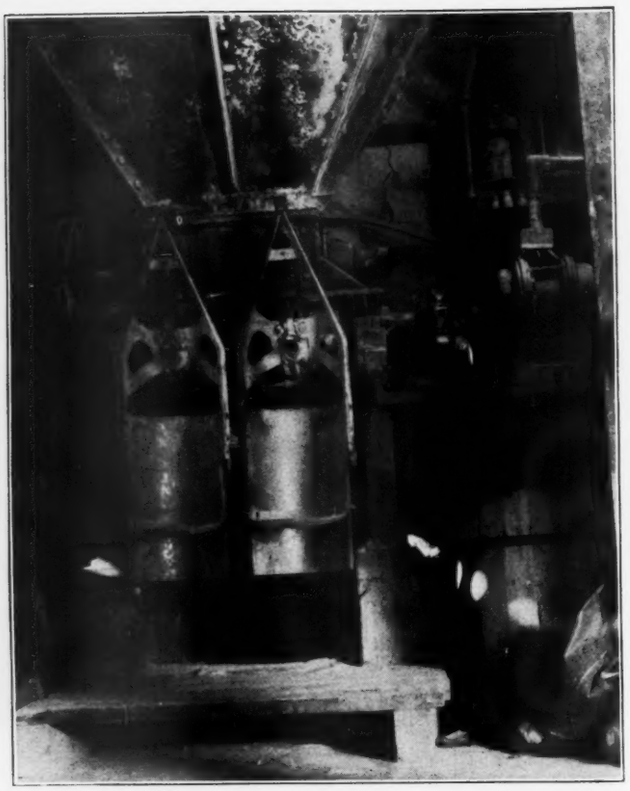
Pipe for Hot Kiln Gases Leading Down to Fan



Pulverizer with Pan Conveyor Leading in at Top



Pan Conveyor from Dumping Hopper to Top of Pulverizer



Valve Bag Packer with Motor at Right

into freight cars on the company's siding alongside the building.

Another improvement at this plant consists of an arrangement for using the gases issuing from the top of the kilns.

The tops have removable covers and a pipe extending across the tops is tapped in at each kiln. This is led down to a motor driven Sturtevant fan and draws down the hot and partially burned gases to force them into a similar distributing pipe extending across the bottom on each side. An auxiliary Sturtevant motor driven fan is used to help force the gas in at the bottom. The illustrations give an idea of some of the piping. The savings realized in this way amount to about 5 tons of coal per day for three kilns.

New Standards Association Succeeds Engineering Standards Committee

Reconstruction of the American Engineering Standards Committee to keep pace with the growth of the industrial standardization movement in the United States is under way. The principal features are the definite federation of national organizations, under the name, American Standards Association, in such a way that trade associations interested in standardization may more readily join in the direction of the movement; placing the technical work of approving standards in a standards council; and concentrating administrative and financial responsibility in a board of directors composed of twelve industrial executives.

The reorganization has been approved by the main committee of the American Engineering Standards Committee and is being voted upon by the member bodies. In submitting the plan for the formal approval of the member bodies, William J. Serrill, chairman of the committee, states: "The ten years' experience of the committee has brought to light certain fundamental difficulties inherent in the old organization. It is the purpose of the reorganization to eliminate these difficulties, to place the operation of the committee on a sound administrative basis, and to facilitate the financing of the work on an adequate scale."

Among the conditions which led to the reorganization, are the growth of the trade association movement together with the predominating position which the trade association is coming to have in the field; and the important part that the plant executive is playing in standardization activities. Recognition of this latter condition is reflected in the board of directors. The industrial executives board is composed of not more than three representatives of each of the member-bodies, councillors serving for three years.

According to Mr. Serrill the underlying principles of the A. E. S. C. remain unchanged. The basic functions remain completely in the hands of the representatives of the member-bodies. The individual members, whether of the board of directors or of the Standards Council, are appointed or nominated by the member bodies, which thus remain the fundamental units in the organization.

The objects of the Association, as stated in the new constitution, will be: To provide systematic means by which organizations engaged in industrial standardization work may cooperate in establishing American Standards in those fields in which engineering methods apply; to serve as a clearing house for information on standardization work; to further the industrial standardization movement as a means of advancing the national economy, and to promote a knowledge of, and the use of, approved American industrial and engineering standards; and to act as the authoritative channel in international cooperation in standardization work.

The revised procedure of the committee, which forms a part of the general reorganization, and in which there is much more flexibility than formerly, is already in effect. Under the new procedure, a sectional committee may operate autonomously, reporting directly, or it may act under a sponsor. Proprietary standards are recognized and may be revised within a single organization on condition that it be shown that the standard is acceptable to the groups concerned. In very simple cases, approval is based upon the action of a conference followed by written acceptances of the interested groups.

USE OF ALLOY STEELS IN THE PIT AND QUARRY INDUSTRIES

By H. W. Munday

Part One

SPECIAL alloy steels have been applied to purposes in the Pit and Quarry Industries largely where wear and abrasion have been great. The application of alloy steels to many services has become well established as economical and in some cases essential. During the past few years the uses of alloy steels have been greatly extended. It is the purpose of this article to discuss various alloy steels and their application in the Pit and Quarry Industries. The alloy steels of the Advance Foundry Company, Chrome Steel Company, Manganese Steel Forge Company and the manganese steel products of such concerns as American Manganese Steel Company, Morris Machine Works, W. A. Riddell Company, Taylor Wharton Iron and Steel Company and others.

In the ordinary simple steels with which we are all familiar the properties of any given piece as to hardness, tensile strength, ductility, etc., depend almost entirely on the heat treatment and mechanical working it has received and the amount of carbon it contains. This carbon content is of very great influence. Iron almost free from it is known as wrought iron or soft steel. As the percentage of carbon increases we get structural steel, tool steel and spring steel, and finally get out of the steel classification altogether and find ourselves dealing with the various forms of cast iron.

Steel depending on its content of carbon only for the determination of its properties is called carbon or simple steel, and forms the great bulk of the product of our rolling mills and steel foundries. It has been known for a long time that the addition of certain other elements, some of them rather rare, to iron has a profound influence on it. Some of these elements need to be added only in small quantities, while others are required in considerable percentages. The special steels used for high-class springs, automobile frames and transmission gears, propeller shafts in steamships, projectiles, transformer cores, highspeed metal cutting tools and similar applications all contain one or more elements other than carbon to better adapt them to the purposes for which they are used. They are all called alloy steels to distinguish them from simple carbon steel.

The Advance Foundry Company of Dayton, Ohio, manufactures an alloy of wide application in the Pit and Quarry Industries, under the name "Strenes" metal. This material is a very hard, long grained, mottled iron alloyed with nickel and chromium. The grain of the casting is unusually long and radiates from the center of the casting outward to all surfaces. All graphitic carbon is eliminated throughout the casting. The Brinnell hardness test averages 405. Strenes metal has a transverse strength per cubic inch of approximately 2,200 pounds.

It is highly heat resistant, having been subjected in test to sixteen heats of six hours duration each at a temperature of 1,600 degrees without developing any signs of warp, distortion or scaling. Another test was made concerning its use in lifters in waste heat kilns in the cement mill of the Wabash Portland Cement Company at Osborne, Ohio. In this instance, Strenes metal withstood a test of 90 days of 24 hours each in a temperature of 1,200 degrees. This metal cannot be machined except by grinding. It can, however, be made with a hard, tough surface and a much softer and machinable metal in other portions.

Strenes metal is used extensively in the Pit and Quarry Industries in chutes for distributing abrasive materials and a special chute has been designed for such service. This metal has been applied in the field as chutes and chute liners, clinker spouts and liners, lifters for waster heat kilns, pump shells, pump liners, pump impellers, conveyor pipe and connections, screw conveyors and housings, ball and rod mill liners, kiln feed spouts, gravity screens, car wheels, rolls, etc. This metal can be used where abrasion and wear are factors but not if the part has to withstand severe blows or strain. It should not be used, for example, for such parts as crusher concaves.

Manganese steel is another alloy. This metal is manufactured by several concerns. It has been known for many years that a small amount of manganese, usually about 1 per cent, in a simple steel tended to prevent brittleness at a red heat, but it was Sir Robert Hadfield, a British metallurgist, who in the early '80s studied the whole series of alloys of iron and manganese, and discovered and made public the unique properties which make it, in certain proportions, so valuable.

Commercial manganese steel as sold today contains from 11 to 14 per cent of manganese, 1 to 1¼ per cent of carbon, and fractional percentages of silicon and phosphorus, the balance being iron. The sulphur is practically zero, being eliminated by the manganese. Alloys with other percentages of manganese may be made, but they are not as

valuable for general use as the one just cited. One containing 4 or 5 per cent of manganese is so brittle as to be readily pulverized by hammering, and no means of toughening it is known.

Employment Conditions Improved

Employment increased during May in a number of industries, latest U. S. Labor Department data indicate. Workers in automobile factories were 6.6 per cent more numerous than in April, it is shown. Brick and tile plants employed 5.2 per cent more labor. The cement industry provided a 3.3 per cent greater number of jobs during the month.

Other increases in numbers of workers reported are: machine tool shops 2.7 per cent; glass works 2.5 per cent; woolen mills 1.0 per cent; electrical machinery and supplies 0.7 per cent; and auto tires 0.6 per cent.

Six of the twelve industrial groups studied by the Labor Department show employment gains in May. These include iron and steel, vehicles, stone-clay-glass, tobacco, paper, and foods. Two having no change are lumber and non-ferrous metals. Textiles, leather, chemicals and miscellaneous report a loss.

Combined data from 54 industries indicate a net decline of 0.2 per cent for the month. This is declared to be seasonal, and is less than in any recent year. In May, 1927, the decrease was 1.0 per cent. In 1926 it was 1.2 per cent, and in 1925 it was 0.7 per cent. In 1924 the fall was 4.2 per cent.

American Investment In Canada

American investments in Canada since the war amount to approximately $2,108,422,000, according to data of the U. S. Commerce Department. This figure is said to be conservative, the extensive contacts between the two countries making exact records difficult to obtain.

In 1919 Canadian securities valued at $211,155,000 were marketed in the United States, the Department's figures reveal. In 1923 the amount fell to $140,957,000. The peak year was 1927 when $316,796,000 was invested. Purchases in 1928 are believed to be proceeding at a rate comparable with that of last year.

The United States holds more Canadian securities than England, it is shown. Estimates from Canadian sources place the present total of American investments across the border at $3,031,000,000, compared with an aggregate of $2,110,000,000 for England. In 1913 the amounts were: England, $1,860,000,000; United States, $417,100,000.

Among the Canadian issues underwritten in the United States in recent years are listed: Dominion and provincial bonds $1,275,860,750, railroad securities $498,255,000, paper industry $346,769,000, public utilities $191,669,500, and miscellaneous manufactures $11,562,500.

Farmers Receiving More

Farmers generally throughout the United States are receiving more for their products than in several years past, according to the U. S. Department of Agriculture. The level of farm prices in May is reported as the highest for that month in 8 years. It is also the highest for any month since August, 1925.

Farm commodities as a whole have advanced in price 32 per cent by comparison with 1921, the department's report reveals. In May, 1927, the rise was only 13 per cent, or 19 per cent less than this year. In 1926 the gain was 24 per cent.

All commodity groups are included in the advance, it is shown. Cotton and cottonseed are bringing an average of 46 per cent more than a year ago. Truck gardeners and orchard cultivators are being paid 23 per cent higher prices for their produce. Grains are selling at the farm gate for approximately 26 per cent above the 1927 scale.

Meat animals have advanced 6 per cent, while dairy and poultry products averaged 3 per cent higher than last year.

The general level of all groups in May also shows a gain of 6 per cent over April of this year, continuing the rising trend which the department's reports have revealed each month since January.

Effect of Stemming on Efficiency of Explosives

In view of certain instances of a remarkable increase in the efficiency of explosives due to the use of stemming, which have come to the attention of the United States Bureau of Mines, a new edition of Technical Paper 17, dealing with this subject, has been issued, containing the details of these instances.

One company reports that, with the use of stemming, a test has shown a saving in powder consumption of approximately 20 per cent. Another company reports that the results of a three months' test in the stopes showed a saving in the consumption of explosives amounting to almost 25 per cent.

The full benefit of "stemming" will only be obtained if systematically enforced throughout a mine. It is necessary to provide plenty of suitable material at some convenient point, so that there is no excuse for not using it. This, however, is not all; intelligent and interested supervision is necessary to insure its general use and to overcome the passive resistance that many men offer to all innovations.

PIT AND QUARRY FOREIGN DIGEST

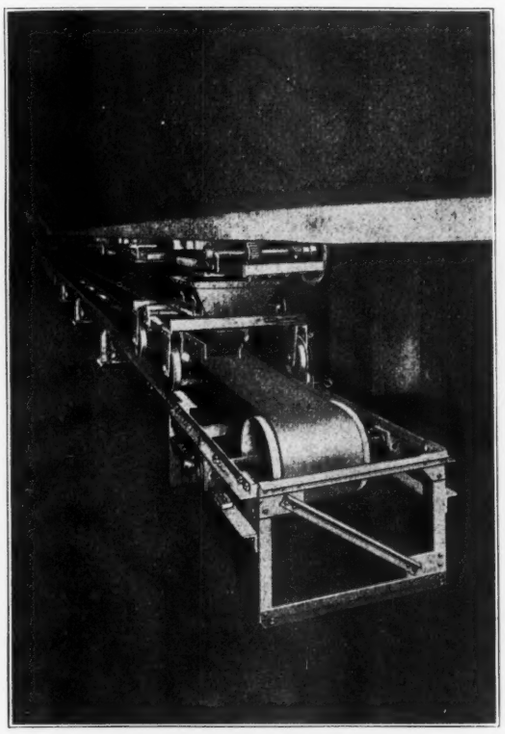


Figure One

The Lime Burning Process

Lime burning is not so simple a procedure as is almost generally assumed. There are involved the behavior and characteristics of the following types of reactions.

(A.) $MeCO_3$ (Crystallized) > MeO (Crystalline) + CO_2 (Gas)

(B.) $MeCO_3$ (Crystalline) > $MeO.n.CO_2$ (Crystalline) + (1-n) CO_2 (Gas)
where 1/n is a constant positive number.

(C.) $MeCO_3$ (Crystalline) > $MeO.x\,CO_2$ (Crystalline) + (1-x) CO_2
where x is a fraction which continually varies between determined limits.

(D.) Reactions between amorphous materials.

(E.) Reactions of reversible equilibria.

On the basis of static and dynamic observations and X-ray investigations, it has been found that calcium oxide and calcium carbonate form homogeneous solid phases, which are of great importance in lime burning, for no carbon dioxide is evolved from this phase unless the pressure of this gas is a determined value lower than the corresponding equilibrium pressure for the system.—F. Hüttig. (Special Report of Meeting German Chemical Society, Dresden, May 31, 1928.)

Conveyors in German Cement Industry

Figures 1 to 5 show various belt conveyors used in the German industry. No. 5 has a 15 per cent grade.—Bruckmann (Zement, June 14, 1928.)

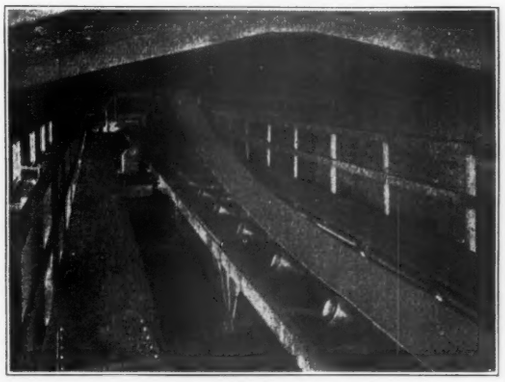


Figure Two

Aluminous Cement

The raw materials, bauxite and lime, are heated separately to a high temperature and brought in this condition to a common fusion chamber, in which they melt because of the ensuing reaction. E. Moyat (German Patent 457, 463.)

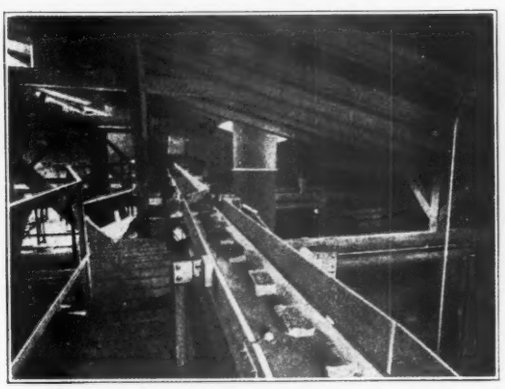


Figure Three

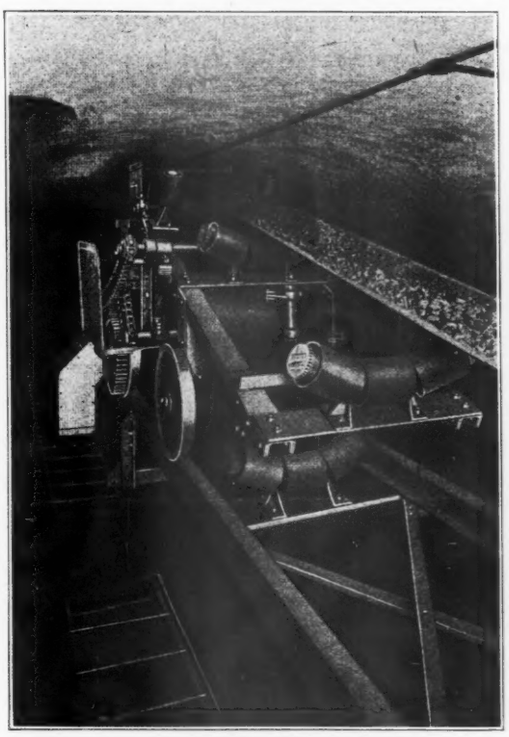


Figure Four

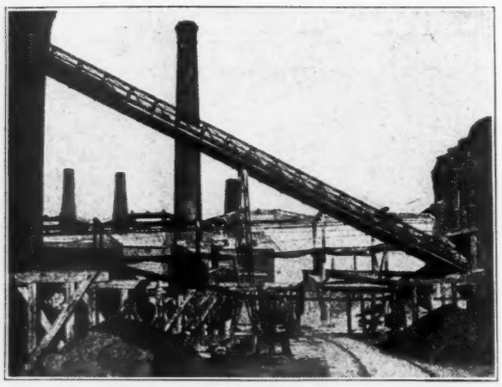


Figure Five

Chemistry of Silicic Acid (Silica.)

Silicon dioxide (silica) forms at least two hydrates, the meta silicic acid ($SiO_2.H_2O$) and the disilicic acid ($2\ SiO_2.H_2O$) both of which are hexametric. The disilicic acid is formed by the direct decomposition of the corresponding alkali silicate in crystalline form. It may be prepared in amorphous form in the silica gel resulting from the hydrolysis of alkali silicate solutions. The meta silicic acid is formed by the topochemical decomposition of sodium metasilicate and it is also produced in the gels formed by the hydrolysis of silicon compounds such as SiF_4, or $SiCl_4$ in the cold. In the alkali silicate solutions the ions SiO_3 and Si_2O_5 are found in equilibrium with the corresponding hydrogen ion concentration favorable to the existence of Si_2O_5 ions.—Robert Schwarz (Zement, June 14, 1928.)

Setting and Hardening of Mortars

On the ground of microscopic observations of the influence of solutions of various kinds upon the cement granule, it is concluded that the setting of hydraulic mortars begins with a crystallization process, with which is intimately associated a gel formation. If the crystallization process is very strong and "powerful" the gel formation which follows is also a vigorous procedure. The acceleration and retardation of the setting caused by the various solutions was observed by noting the early or late crystal and gel formation. It is dependent upon the concentration of the solution. Different concentrations of one and the same solution can be used to cause acceleration and retardation. If the solutions used react with the free lime present in setting cement, crystals are formed of a different sort than those in a normal setting. The salt solutions, in most cases, exhibit an electrolytic effect upon the coagulation as well as the gelatinization of the gel. The crystallization process is of especial importance as is evidenced by the setting of aluminous cement. The behavior of the gel in the setting process does not seem to be of outstanding importance in all cases. Its presence in the hardening, and above all in the "after hardening" periods is of great influence because of its increase of the density and its slow drying with gradual increase in the strength of the cement. The influence of gypsum is referable to two considerations. It retards the production of the typical crystals by combination of the free lime and also by its retardation of the coagulation of the silicate gel. The increase in strength caused by gypsum is considered to be due to its own crystallization which adds its strength to the cement.—Karl Biehl (Zement, June 14, 1928.)

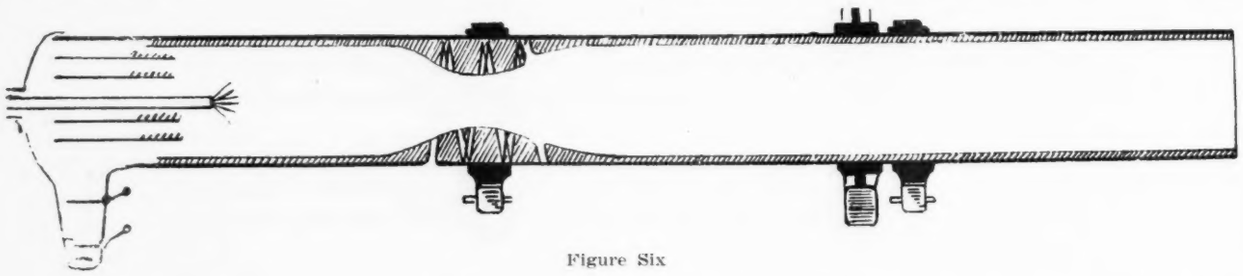


Figure Six

New German Rotary Kiln

Figure 6 shows the usual kiln with construction at the sintering zone. Figure 7 shows a cross-section of Kyriacou's kiln claimed by the inventor to provide in practice a much improved thermal balance. (Zement, June 21, 1928.) "Neigung"—slope.

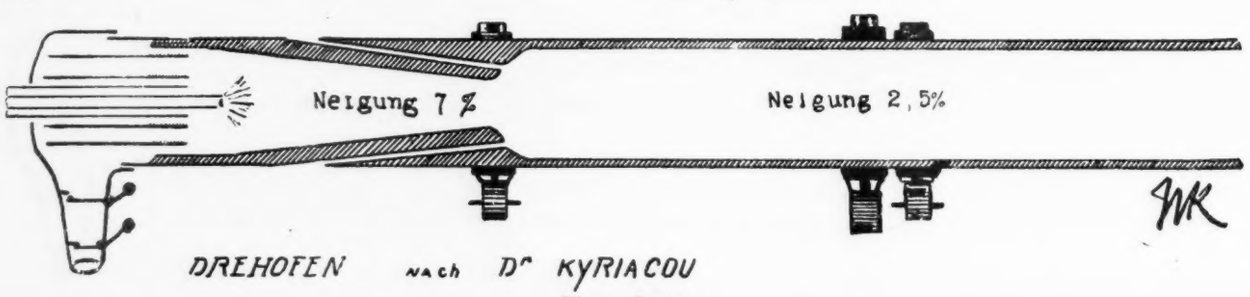


Figure Seven

Record June Construction

June construction contracts in the territory east of the Rocky Mountains broke all previous June records, according to F. W. Dodge Corporation. New building and engineering work contracted for last month in the 37 Eastern States (including about 91 per cent of the total country) amounted to $650,466,200. This figure was the second highest monthly total on record. It was 3 per cent ahead of the June, 1927, record and was only about two and one-half per cent under the total for the preceding month of this year.

Last month's contract total made another record. It brought the total amount of new construction work started in these states since the first of this year up to $3,444,867,500, which was the largest first six-months' total on record. The increase over the first half of last year was 8 per cent.

The June contract record included the following important classes of work: $258,083,700, or 40 per cent of all construction for residential buildings; $130,852,400, or 20 per cent, for public works and utilities; $93,942,200, or 14 per cent, for commercial buildings; and $63,536,700, or 10 per cent, for industrial projects.

Contemplated new work reported in June amounted to $1,030,095,000, being 17 per cent in excess of the May, 1927, total and 41 per cent ahead of the June, 1927, record.

New York and Northern New Jersey

The June total for building contracts in New York State and Northern New Jersey, amounting to $175,908,000, was the highest June figure yet recorded for this district. There was an increase of almost $800,000 over the amount reported in June of last year, but there was a drop of 5 per cent from the total for the preceding month of this year.

Analysis of the June building record showed the following outstanding items: $81,097,900, or 46 per cent of all construction, for residential buildings; $42,458,600, or 24 per cent, for commercial buildings; $21,405,900, or 12 per cent, for public works and utilities; and $11,274,900, or 7 per cent, for educational projects.

New construction started in this district during the first half of this year amounted to $933,713,600, being a 9 per cent gain over the total for the first half of last year.

Contemplated construction projects were reported in June to the amount of $327,788,400. This figure shows an increase of 23 per cent over the amount reported in May of this year, and there was a 77 per cent increase over the total for June of last year.

New England States

Construction started in June in the New England States reached a total of $41,059,000. This figure was the second largest June contract total on record for this district. There was an increase of 15 per cent over the total for June of last year, but there was a drop of 32 per cent from the amount reported in May of this year. Last month's building and engineering record included: $19,029,600, or 46 per cent of all construction, for residential buildings; $6,789,400, or 17 per cent, for public works and utilities; $4,801,600, or 12 per cent, for educational projects; and $4,457,500, or 11 per cent, for commercial buildings.

The first six months' construction total for the district was $248,046,100, which was a 21 per cent increase over the total for the first six months, 1927.

Contemplated new work reported in New England in June amounted to $83,716,800. There was a 74 per cent gain over the total for the preceding month of this year, and last month's contemplated record was more than double the amount reported in June of last year.

Middle Atlantic States

June building and engineering contracts in the Middle Atlantic States (Eastern Pennsylvania, Southern New Jersey, Maryland, Delaware, District of Columbia and Virginia) amounted to $76,443,100. This figure was the highest June contract total ever recorded in these states. It was 4 per cent ahead of the total for June of last year, but was 1 per cent under the total for May of this year.

The more important items in the June construction total were: $33,221,300, or 44 per cent of the total, for residential buildings; $10,351,700, or 14 per cent, for public works and utilities; $9,562,200, or 13 per cent, for industrial projects; and $7,235,900, or 10 per cent, for social and recreational projects.

During the past six months there was $423,895,900 worth of new construction work started in the Middle Atlantic States, as compared with $378,364,900 for the corresponding period of last year, the increase being 12 per cent.

Contemplated projects as reported last month in this district reached a total of $85,174,800. This figure shows a drop of 38 per cent from the amount reported in the preceding month and there was a loss of 19 per cent from the amount in June, 1927.

Pittsburgh District

The total volume of contracts let in the Pittsburgh District (Western Pennsylvania, West Virginia, Ohio and Kentucky) during June amounted to $78,784,300. This figure was the second largest June contract total on record for this territory. It was 19 per cent ahead of the total for May of this year, as well as 4 per cent over the total for June of last year.

Analysis of last month's building and engineer-

ing record showed the following important classes of work: $25,035,200, or 32 per cent of all construction, for public works and utilities; $22,756,700, or 29 per cent, for residential buildings; $9,132,600, or 12 per cent, for commercial buildings; and $7,919,000, or 10 per cent, for industrial projects.

Building and engineering work started in this district during the first six months of this year has reached a total of $366,193,500, being a drop of 10 per cent from the amount started in the corresponding six months of last year.

Contemplated new work reported in June in the Pittsburgh District amounted to $95,514,300. There was an increase of 18 per cent over the total for the preceding month of this year and there was a 56 per cent gain over the total for the same month of last year.

Central West

The June total for building contracts let in the Central West (Illinois, Indiana, Iowa, Wisconsin, Southern Michigan, Missouri, Kansas, Oklahoma and Nebraska) amounting to $192,700,300, was the second highest June contract total ever recorded in this district. There was a drop of only 1 per cent from both the May, 1928, total and the June, 1927, record. Analysis of the June construction report in the Central West showed the following important classes of work: $76,235,600, or 40 per cent of the total, for residential buildings; $41,505,700, or 22 per cent, for public works and utilities; $23,438,000, or 12 per cent, for commercial buildings; and $22,208,000, or 12 per cent, for industrial projects.

During the past six months there was $1,015,784,600 worth of new construction work started in the Central West, as compared with $873,452,000 for the corresponding period of last year, the increase being 16 per cent.

Contemplated new work as reported last month in this district reached a total of $348,442,600. Last month's record was 54 per cent ahead of the total reported in the preceding month of this year and was 57 per cent ahead of the total for the same month of last year.

Northwest

The Northwest (Minnesota, the Dakotas and Northern Michigan) had $7,749,700 in contracts for new building and engineering work during the past month. There was a drop of 18 per cent from the May, 1928, total and a loss of 7 per cent from the June, 1927, record. Included in last month's construction report were: $2,936,500, or 38 per cent of the total, for public works and utilities; $1,939,500, or 25 per cent, for residential buildings; $702,500, or 9 per cent, for commercial buildings; and $640,000, or 8 per cent, for hospitals and institutions.

New construction started in the Northwest since the first of this year amounted to $35,178,300, being a loss of 16 per cent from the total for the first half of last year.

New work contemplated in this district during the past month reached a total of $8,781,000. There were losses of 26 per cent from the amount reported in the preceding month and 34 per cent from the amount reported in June of last year.

Southeastern States

During the past month there was $51,579,600 worth of contracts awarded on new building and engineering work in the Southeastern States (the Carolinas, Georgia, Florida, Tennessee, Alabama, Mississippi, Arkansas and Louisiana). The above figure was 3 per cent in excess of the May, 1928, total and was 2 per cent ahead of the June, 1927, total. Included in last month's building and engineering record were the following outstanding items: $16,611,200, or 32 per cent, for public works and utilities; $16,537,800, or 32 per cent, for residential buildings; $8,457,200, or 16 per cent, for industrial projects; and $3,867,100, or 7 per cent, for commercial buildings.

New construction started in the Southeastern States during the first six months of this year amounted to $292,834,300, which was a loss of 7 per cent from the amount started during the first six months of 1927.

Contemplated new work reported in this district in June reached a total of $52,636,800. This figure was 31 per cent below the amount reported in May of this year and was 26 per cent under the June, 1927, record.

Texas

Contracts let on new building and engineering work in the state of Texas during the past month, amounting to $26,242,200, was the largest June contract total ever recorded in this state. It was 29 per cent ahead of the June, 1927, record, but was 2 per cent less than the total for May of this year.

Included in last month's record were the following important items: $7,265,300, or 28 per cent of all construction, for residential buildings; $6,216,800, or 24 per cent, for public works and utilities; $6,073,000, or 23 per cent, for industrial projects; and $3,028,500, or 12 per cent, for commercial buildings.

Last month's contract record brought the total amount of new construction started in this state since the first of this year up to $129,221,200, which was a 12 per cent increase over the amount started during the corresponding period of 1927.

Contemplated projects as reported in Texas in June amounted to $28,040,300. There were decreases of 19 per cent from May of this year and 7 per cent from June of last year.

INTIMATE NEWS OF MEN AND PLANTS

New Duquesne Slag Plant

The Duquesne Slag Products Company of Duquesne, Pennsylvania, has leased the furnace property in Topton, formerly owned by the Empire Steel and Iron Company, from the present owner, A. Sofranscy. On the property is a slag bank, estimated to contain about a million tons, and the old furnace properties, as well as a row of 20 houses.

Plans are to erect a new crusher and to remodel the present buildings so they can be used in making slag products. Operation is expected to begin within six months.

Marblehead Lime Promotes

The Marblehead Lime Company recently appointed Wallace E. Wing, manager of the Hannibal, Missouri, plant to succeed L. R. Stolberg, who is taking the position of traffic manager for the New England Lime Company of Pittsfield, Massachusetts.

Oregon Firm Buys Lime Plant

The Standard Lime and Plaster Company of Portland, Oregon, recently purchased the property of the Union Lime Company near Grants Pass, consisting of more than 200 acres of lime rock.

According to D. N. Littler, president of the Portland concern, immediate development is planned; new lime kilns and a new crushing and screening plant with a daily capacity of 50 tons of chicken grit are to be erected and a road is to be built to the railroad at Grants Pass. An annual capacity of about 100,000 tons of burnt lime, agricultural lime, and chicken grit is expected.

Lawrence Keefe Dead

Lawrence Keefe, 46 years old, president of the Northwest Lime Company, died June 23 at his home, 7527 Renton Avenue, Seattle, Washington. Burial was at Acacia Park Cemetery on June 25.

New Georgia Plant Now Under Construction

The Piedmont Corporation of New York City recently purchased Rock Chapel Mountain in De Kalb County, Georgia, consisting of 100 acres of granite and several hundred acres of adjoining land.

A railroad from Lithonia to the mountain is now under construction and a crushed stone plant, homes for the employes, and an asphalt mixing plant will be erected.

New California Rock Firm Operates Two Quarries

The Pacific Minerals Company of Richmond, California, was recently formed with a capitalization of $500,000. The new company is taking over a rock quarry at Angels Camp, formerly operated by the Angels Greenstone Company, and a slate crushing plant at Placerville formerly operated by Western Slate Products Company.

Charles S. Renwick of Richmond is president; Kenneth A. Williams of Altadena, vice president; T. H. DeLap of Richmond, secretary; Larkin J. Younce of Richmond, and Malcolm Stewart of Burlingame are directors.

The firm will crush slate and greenstone for use in the manufacture of various types of roofing materials and will maintain its offices in the American Trust Building in Richmond.

United States Gypsum Moves Northeastern Office

The United States Gypsum Company has moved the office of its northeastern sales district to 100 Boylston Street, Boston, Massachusetts. A. L. Sleeper is sales manager.

The location of the new office is in line with the policy of the company in keeping its facilities as near together as possible, the new plant at Charlestown now being under construction.

County to Operate Quarry

Judge E. J. Ward, Commissioners Frank Livermore and J. M. Hiatt, and County Engineer Charles Jones, of Washington County, Oregon, have selected a site for a rock quarry and crusher near Bacona. Work is expected to start immediately and the rock produced will be used for road work.

Kentucky Firm Changes Name

The Southern Amiesite Asphalt Company of Lexington, Kentucky, recently changed its name from Kentucky Amiesite Company and increased its capital from $50,000 to $100,000.

Universal Cement Promotes F. L. Stone

The appointment of F. L. Stone as general sales manager of the Universal Portland Cement Company was announced recently by B. F. Affleck, president. He succeeds Blaine S. Smith who resigned to become president of the Pennsylvania-Dixie Corporation.

Mr. Stone was born at Camden, Arkansas, and was educated at the University of the South, Sewanee, Tennessee, and at the United States Naval Academy, Annapolis. He is a member of the Chicago Club, Hamilton Club, Executives Club, Indiana Society, Exmoor Country Club and Kappa Sigma fraternity.

Best Brothers Move Chicago Office

The Best Brothers Keene's Cement Company recently moved their Chicago office from the former location at 1558 Conway Building to the Builders' Building at 228 North LaSalle Street.

Gibsonburg Lime Opens New York Office

The Gibsonburg Lime Products Company of Gibsonburg, Ohio, recently opened a New York office at 1143 Bryant Park Building, 55 West 42nd Street under the management of C. C. Young.

New Virginia Company

The Virginia Sand and Gravel Association of Norfolk, Virginia, a nonstock corporation, was recently chartered by the State Corporation Commission at Richmond. Officers are: John Twoby, president; E. J. Doran, secretary; and G. T. Smith.

New Illinois Pit

Victor E. Peterson, of Harvard, Illinois, recently commenced operation of a sand and gravel pit on his farm four miles from that city. Modern machinery has been installed for handling the material which will be sold locally.

American Potash Company Formed in Texas

The American Potash Company was recently formed to mine potash on 3000 acres of land in Ector County, 11 miles south of Odessa, Texas. Core drill tests have proven the presence of potash on this property as well as on land in Midland County owned by the same firm. Plans are to build a refinery in Odessa and actual mining is expected to begin within six months.

Behind the developments are: M. Agress, J. N. Stier, J. B. Abdou, Jr., J. L. Lancaster, H. R. Mitchell, Hugo Schoellkopf, F. F. Florence, L. M. Bourne, Wirt Davis, and F. G. Leacham, all of Dallas, and A. L. Carter of Houston.

California Plant Operating at Capacity

The Sunset Rock Products Company, located in the San Fernando Valley, a few miles from Los Angeles, is delivering as high as 150 tons of sand and crushed rock per hour from its $200,000 plant, which has been in operation less than a year. It has a capacity of 2000 tons daily and a storage capacity of over 40,000 tons. W. D. Fredericks is president; F. W. Clark, general manager; and R. W. Clark, secretary. Other officials are Judge W. H. Lyon and P. E. Wood.

A fleet of 42 trucks, 28 six wheelers and 14 four wheelers, are used to make deliveries. These trucks are equipped with bodies designed and built by the Standard Auto Body Works of Los Angeles, and St. Paul Underbody hydraulic hoists, made by the Hydraulic Hoist Manufacturing Company of St. Paul, Minnesota, are the dumping units.

J. Reeback Made Secretary of Rockwood Company

Joseph Reeback, formerly general manager of the Higginson Manufacturing Company of Newburgh, New York, has been made secretary of the Rockwood Gypsum Lumber Corporation of New York, which has been organized to manufacture fireproof Rockwood gypsum lumber.

Tacoma Washington Plant Under Construction

Actual construction work has begun on the $1,000,000 plant of the Tacoma Electrochemical Company, Tacoma, Washington, a subsidiary of the Pennsylvania Salt Company. The Company owns 40 acres on the Hylebos waterway and is erecting three buildings with 27,000 square feet of floor space.

Alberta Tar Sand Deposits To Be Developed

The Imperial Chemical Industries, Limited, a British concern of which Sir Alfred Mond is president, recently obtained an option on 12,000 acres of land between Fort McMurray and Fort McKay, Alberta. Development on a large scale of tar sand deposits on this property is planned.

Illinois Sand Plant Damaged By Blast

The Du Page Sand and Gravel Company recently suffered a loss of about $1000 when the machinery in their pit between West Chicago and Warrenville, Illinois, was blown up by unknown persons. New machinery is being installed.

New Maine Plant Operating at Capacity

The plant of the Lawrence Portland Cement Company at Thomaston, Maine, which was completed in May of this year at a cost of approximately $4,000,000, is now operating at its capacity, 12,000 bags of Dragon brand cement per day. 800 acres of land, including a lime plant manufacturing Mainrok lime, were purchased by the company, which is said to operate the only cement mill in Maine.

Frank H. Smith is president; Marion S. Ackerman, vice president; Charles A. Porter, second vice president; James S. Van Middlesworth, secretary; Edgar F. Sheppard, treasurer; James H. Ackerman, assistant sales manager, and E. J. Davis, plant superintendent. This company also operates a plant at Siegfried, Pennsylvania.

U. S. Gypsum to Improve Montana Plant

The United States Gypsum Company plans to completely modernize the gypsum mill at Gypsum, Montana, which was recently purchased from the North West Products Company. The mill will be revised to make possible the manufacture of gypsum plaster and the mill structure and site will be improved.

California Asbestos Mine To Resume

F. S. Gray and A. George have acquired control of an asbestos mine about 25 miles southwest of India, California. The mine, which was producing 25 or 30 years ago, has been inactive until just recently because of poor transportation.

Carl R. English Appointed By Pacific Coast Cement

Carl R. English, formerly purchasing agent and general storekeeper for the Todd Dry Docks, Inc., was recently appointed purchasing agent for the Pacific Coast Cement Company, as well as the Pacific Coast Coal, Engineering, and Steamship Companies. He succeeds the late Malcolm McPhee.

Sandusky Cement Expands

The Sandusky Cement Company of York, Pennsylvania, recently purchased 50 acres of land in Hellam township from the Cooper Manufacturing Company. This tract is located on the Pennsylvania Railroad, adjoining another tract on the other side of the railroad that was purchased some time ago.

Washington Rock Plant Sold

W. R. Osborne of the Harbor Dredging Company recently purchased the S. L. Dennis rock crushing and loading plant at the Narrows near Raymond, Washington. The plant, which was constructed early this year and has a 30 ton capacity, is equipped to load by either truck or scow.

Florida Lime Firm to Erect New Plant in Alabama

The Marianna Lime Products Company of Marianna, Florida, has formed a new company called the Alabama Lime Products Company. This company has acquired lime rock deposits near Florala, Covington County, Alabama. The crushing plant will be located at McRae on the Central of Georgia Railroad which will construct a spur to the plant from its main line.

Lone Star Cement Appoints D. S. MacBride

D. S. MacBride, formerly district engineer for the Portland Cement Association, has been appointed vice-president of the Lone Star Cement Company of Pennsylvania, which was recently taken over by the International Cement Corporation.

U. S. Gypsum Acquires Chicago Plant Site

The United States Gypsum Company has purchased a 32 acre tract on the Indiana Harbor Canal at East Chicago, Indiana. Construction of a manufacturing plant will start at once. Raw gypsum will be shipped in from Alabaster, Michigan and will be stored in silos at the plant. The gypsum produced will supply the Chicago metropolitan district and will supplement the shipments heretofore made from the Fort Dodge, Iowa, and Grand Rapids, Michigan, plants.

Missouri Pit Resumes Operations

The Northeast Missouri Sand and Gravel Company, whose plant on Salt River south of New London, Missouri, was recently flooded by high water, has resumed operations. Little damage was done to the plant and machinery.

Indiana Firm Improves Pit

The Christner Gravel and Construction Company is installing electrical equipment in the pit five miles east of Wakarusa, Indiana. With the new equipment the pit will have a capacity of 600 yards per day.

New Corporations

Louks Sand & Gravel Co., 609 E. Main St., Newark, O. $40,000 pfd.; 100 shares n. p. v. Coleman R. Louks, Gen. Mgr.; James F. Baird, Nellie M. Bolin-Louks.

North Jersey Sand & Stone Co., Spring Lake, N. J. 15,000 shares n. p. v. (Purchased Warren Sand & Gravel Co., Carpentersville, N. J.)

Fayetteville Sand Co., Syracuse, N. Y. $5,000. L. P. Costello.

Lawton Glass Sand Co., Lawton, Ky. $10,000. H. W. Hillman, Pres.; R. G. Hillman, V. P.; Harold Hillman, Sec.-Treas. Bought Interstate Window Glass Co., a Pennsylvania company. Same owners operate Tygart Limestone Co., Lawton, Ky., the deposits of glass sand and high calcium limestone being in the same hill.

Bald Mountain Lime Co., R. W. Fisher, Mechanicville, N. Y. $40,000.

National Marble Co., Dragoon, Ariz. $2,500,000. B. D. Blakeslee, Paradise, Ariz.; Bruce Stephenson, M. J. Donahue, Douglas, Ariz.

Union Stone Co., Box 1837, El Dorado, Ark. $15,000. J. W. Russell, Helen Russell, George M. Le Croy.

Glen Allen Sand Co., Carbon Hill, Ala. $3,000. R. G. Wheeler, Gen. Mgr.; Cad Jones, Monroe Jones.

Charleston Gravel Co., Charleston, Miss. $30,000. W. V. and J. K. Morrison, Jos. P. Corey, Jr., Charleston, Miss.; Jos. P. Corey, Sr., Memphis, Tenn.

Smoky Mountain Sand Co., Knoxville, Tenn. $50,000. Ben Catlett, J. L. Greer, E. L. Walker, A. L. Reynolds.

Chelsea Sand & Ballast Co., Cyril Dill, 129 Aris Ave., New Orleans, La. $10,000.

Co-operative Sand Co., Newark, N. J. $100,000 pfd.; 2500 shares n. p. v. C. Wallace Vail.

Southern Consolidated Granite Corp., Spartanburg, S. C. $1,000,000. Paul M. Allen, Gen. Mgr.; Robt. A. Cooper, Chairman of Board; John M. Crewer, Pres.; E. O. Frierson, V. P. Merger of about 25 limestone, granite, and marble quarries in Va., N. C., S. C., and Ga. Through the amalgamation, capacity of the crushed stone plant of Spartanburg Quarries Corp., Pacolet, S. C., will be doubled.

Eastern Silica & Chemical Corp., Winchester, Va. John F. Penrose, 252 W. 85th St., New York; D. H. Sencindiver, Winchester.

Corona Silica, Inc., c/o Corp. Service Co., Wilmington, Del. $750,000.

Hockensmith Granite Works, Inc., Wadsworth, O. 250 shares n. p. v. J. B. Williard.

Texas Nitrate and Potash Plant Being Built

A. A. Snell and associates are developing a recently discovered and tested deposit of nitrate of soda and potash on 6000 acres of land in Presidio County, Texas. The company, which will be known as the Nitrate Corporation of America, will be capitalized at $500,000.

Although the charter has not yet been received, machinery is already being installed. Two crushers with a daily capacity of 500 tons are on the grounds, one is en route, while still another is being prepared for shipment. Work is already started on a road from the mines to Quebec, the nearest railroad point on the Southern Pacific Railroad, and work on the mines and homes for the employes is being pushed so that production can begin when all of the machinery is installed.

A fleet of heavy duty trucks will be used for transportation until the production warrants the construction of a spur track to the railroad. Plans are to use a 100 foot waterfall on the property for electric power both for the plant and transportation facilities.

Alton J. Blank Leaves La Tolteca Cement

Alton J. Blank, chief chemist of the "La Tolteca" Portland Cement Company of Tolteca, Hidalgo, Mexico, has resigned, effective August 1st, to become general superintendent and supervising chemist for the "Landa" Portland Cement Company. His new address will be Apartado Num 232, Pueblas, Estado de Puebla, Mexico.

New Jersey Plant Sold

The North Jersey Sand and Stone Company, with home offices in Spring Lake, New Jersey, has purchased the Warren Sand and Gravel Company of Carpenterville. Plans are to double the present annual production of 100,000 tons of washed sand and gravel.

Officers of the purchasing company are: Claude English, president; David W. Newman and Elmer H. Geran, vice president; and Edwin H. Conover, secretary treasurer.

West Virginia Quarry Has Large Blast

The Boxley Rock Quarries recently detonated a blast that was estimated to have moved 120,000 tons of stone at their quarry in Pounding Mill, near Bluefield, West Virginia. The blast, which was in charge of Sam Russell, technical field expert of the Du Pont Powder Company, required 21 tons of dynamite.

Indiana Cement Company Promotes Pierson

G. E. Pierson, sales manager of the Indiana Portland Cement Company of Indianapolis, Indiana, has been appointed manager of that company to succeed D. S. MacBride, who will retain the office of vice-president. Mr. Pierson formerly was manager of the Kansas Portland Cement Company of Kansas City.

Monolith Installs Huge Kiln

The Monolith Portland Midwest Company is installing what is probably the largest cement kiln in the world at the new plant near Laramie, Wyoming. The kiln is 341 feet long, from 10 feet to 11 feet 3 inches in diameter, and is made of open hearth steel from 13/16 to 1 inch thick. It is supported on five concrete piers and weighs 1,785,000 pounds, or 900 tons when in operation under load.

South Carolina Quarry Electrifies

The Capital Granite Company of Blairs, South Carolina, is installing electrically driven crushers, shovels and other equipment for handling crushed granite at the quarry near that city. A capacity of 40 cars of rock per day is planned. Robert G. Lassiter of Oxford is president of the company.

Pacific Coast Cement Expands

The clinker storage building of the Pacific Coast Cement Company, Seattle, Washington, on the East Waterway, is under construction, the foundation already being in place and the erection of steel expected to begin soon. The building is being erected on the 20 acre plant site on East Marginal Way south of Spokane Street and is 85 feet wide by 360 feet long.

British Firm Buys Interest In Canadian Salt Mines

The Imperial Chemical Industries, Ltd., of London, England, has acquired a substantial interest in the Malagach Salt Company, Ltd. The daily output of salt is about 125 tons and surveys are being made to determine the possibilities of potash production.

Michigan County Purchases Gravel Pit

The Calhoun County Road Commission, Marshall, Michigan, has purchased 30 acres of land near Pennfield to be used for a gravel pit. The property is located on the Grand Trunk railroad.

Illinois Stone Quarry Being Dismantled

The Illinois Steel Company is dismantling and removing all crushers, draglines, tracks and other machinery from the quarry near Fairmount, Illinois. Operation was suspended last November after 25 years of active production.

Indiana Company Expands

The Western Indiana Gravel Company of Terre Haute, Indiana, has opened a retail yard at Tenth and One-half and Chestnut streets. A. F. Neville is manager of the plant and the new yard.

Ohio Plant Damaged by Fire

The hoisting building of the Ohio River Sand and Gravel Company of Wheeling, West Virginia, which was recently damaged by fire to the extent of $4000, is to be replaced.

National Gypsum Produces Gypsum Tile Board

The National Gypsum Company of Buffalo, New York, is producing the National Gold Bond tile board, said to be the first perfected gypsum tile board. Advantages claimed are that it will not warp, is fireproof and will shed water like a ceramic tile. This product is particularly adapted to home modernization.

Feldspar in 1927

The crude feldspar sold or used by producers in the United States in 1927 amounted to about 202,497 long tons, valued at $1,424,755, or $7.04 a ton, according to reports obtained directly from producers by the United States Bureau of Mines, Department of Commerce, in cooperation with the geological surveys of Maryland, New York, North Carolina, and Virginia. These figures show a decrease of 4 per cent in quantity and 11 per cent in total value compared with 1926. Feldspar was mined and sold in 1927 in 12 States, namely, Arizona, California, Colorado, Connecticut, Maine, Maryland, New Hampshire, New York, North Carolina, Pennsylvania, South Dakota, and Virginia. The greatest feldspar-producing region is that which includes the Atlantic seaboard States, from Maine to North Carolina. This region reported about 94 per cent of the total production and value in 1927. North Carolina, the leading State, reported about 50 per cent of the total output; Maine, the second State, reported nearly 17 per cent; and New Hampshire, the third State, nearly 14 per cent. The average value per long ton in North Carolina was $6.08; in Maine, $8.72, and in New Hampshire $8.13.

Except for minor purposes, feldspar is prepared for use by grinding. This work is done principally by commercial mills; only a very small portion is ground by users in their own mills. In 1927 there were 32 commercial mills operated in 13 States, namely, California, Colorado, Connecticut, Illinois, Maine, Maryland, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, and Tennessee. These mills reported 223,915 short tons of ground feldspar sold in 1927, valued at $3,564,141, or $15.92 a ton, compared with 225,362 tons, valued at $3,775,797, or $16.75 a ton, in 1926, a decrease of less than one per cent in quantity and 6 per cent in value. Of the quantity sold in 1927, 194,672 short tons, valued at $2,946,154, or $15.13 a ton, was domestic feldspar, and 29,243 tons, valued at $617,987, or $21.13 a ton, was imported feldspar, including Cornwall stone. Imported feldspar was ground in two States in 1927—New York and Ohio. These figures represent an increase in imported feldspar as compared with 1926.

The production of crude feldspar by States in 1926 and 1927 is shown in the following table:

Crude feldspar sold or used by producers in the United States in 1926 and 1927

State	1926 Long tons	1926 Value (a)	1926 Long tons	1926 Value (a)
Arizona	(b)	(b)	(b)	(b)
California	6,271	$ 49,300	5,260	$ 43,329
Colorado	(b)	(b)	(b)	(b)
Connecticut	11,436	87,844	6,123	43,319
Maine	33,897	306,695	34,328	299,386
Maryland	(b)	(b)	2,001	11,612
New Hampshire	33,271	287,596	27,449	223,077
New York	15,517	157,865	12,020	96,446
North Carolina	91,433	602,020	100,756	612,214
Pennsylvania	1,484	4,492	3,938	24,257
South Dakota	(b)	(b)	(b)	(b)
Virginia	(b)	(b)	(b)	(b)
Undistributed	16,680	111,289	10,622	71,115
	209,989	$1,607,101	202,497	$1,424,755

(a) Value at mine or nearest shipping point.
(b) Included under "Undistributed."

New Blue Ridge Talc Plant In Operation

The pigment plant of the Blue Ridge Talc Company at Henry, Virginia, consists of a main grinding building, finished warehouse, raw material storage, shop and store room and office building. The company is one of the largest producers of mineral colors and its products include soapstone, cement, stucco and mortar colors, ochres, mineral blacks and foundry facing.

The old plant was completely destroyed by fire in February and the new plant is of all steel and concrete construction. In spite of the one month's suspension caused by the fire all orders were filled, according to C. O. Kitson, secretary of the company, who also planned the new plant.

Crude ores for operation are shipped in from the Lake Superior region, Alabama, Texas, Louisiana, West Virginia, Tennessee and Georgia to supplement the quarry operations at Henry where the soapstone is taken from an 80 foot face. The stone is transported 2,500 feet to the plant by a 36-inch gauge tramway, using 2 yard Koppel dump cars and gasoline power.

In the raw material storage building an overhead tramway transports the materials over a Howe suspended scale. In the main grinding room a Jeffrey hammer mill reduces all ores to ½ inch size after which a Sturtevant bucket elevator delivers the ore to a Fuller Lehigh 36 inch by 30 foot rotary dryer. Another steel bucket elevator delivers the dry ore to the steel pulverizer service bin.

A Raymond 4 roller mill pulverizes the ore so that 98 per cent or more will pass through a 325 mesh screen. Pulverized material is removed by a vacuum fan, both the mill and fan having Allis Chalmers Texrope drives. Delivery is made into either the bagger bin or a blending bin. Shades requiring blending are delivered into a 25 ton steel bin having a one ton weigh hopper suspended from Standard Scale Company scales.

Blending or mixing is done in a 4000 pound 3 by 12 foot Salem mixer which discharges into an elevator to the bagger bin. Finished material is bagged in 50, 75 and 100 pound paper, paper lined and plain jute bags, and some packed in wood barrels, steel drums and cans.

Iowa Quarry Sold

The Dickinson-Stark Company, excavating contractors of Des Moines, Iowa, have acquired the quarry and crushing plant of the Decorah Stone Products Company at Decorah.

NEWS OF EQUIPMENT MANUFACTURERS

Chisholm Moore Changes Name and Elects Officers

The Chisholm Moore Manufacturing Company of Cleveland, Ohio, which was recently purchased by the Columbus McKinnon Chain Company of Tonawanda, New York, will hereafter be known as Chisholm Moore Hoist Corporation (Division of Columbus McKinnon Chain Company).

A recent meeting was held at which the following officers and directors were named:

Julius F. Stone, president; Julius F. Stone, Jr., vice president; J. C. Dunn, vice president and treasurer; Frederick Mitchell, secretary; and Julius F. Stone, Julius F. Stone, Jr., J. C. Dunn, A. L. McKinnon and Frederick Mitchell, directors. John R. Mears continues as sales manager of the new corporation.

Payne G. West Moves Offices

Payne G. West, Contractors and Industrial Equipment, announces the removal of offices from 1448 Wabash Avenue to 1193 Lawrence Avenue, Detroit.

New Link Belt 2 Yard Crane

The Link-Belt Company of Chicago, Indianapolis and Philadelphia have added a 2 yard capacity crane, Model K-55, to their line of crawler cranes, shovels and draglines, the largest capacity machine heretofore built by this company being a 1½ yard unit.

As a shovel this machine has a 30 foot boom and an 18 foot dipper stick carrying a 2 yard struck-measure-capacity, all manganese steel dipper.

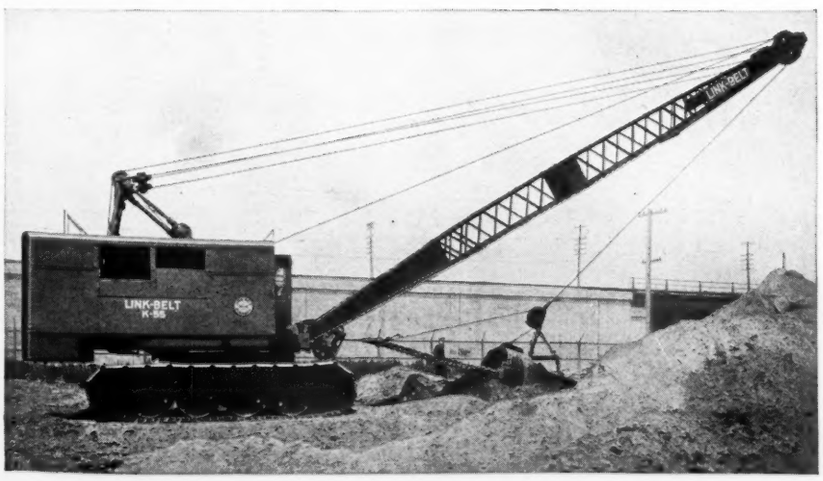
As a dragline it handles a 2 yard dragline bucket, for medium and medium-heavy excavating on a 50 foot boom; or a 1½ yard bucket on a 60 foot boom.

As a clam shell bucket of 2 yard capacity, for sand, gravel or materials of equal weight per cubic foot, and consistency, it is equipped with a 50 foot boom; and with a 1½ yard bucket, in the same materials, a 60 foot boom. As a trench shovel it has a 2 yard capacity.

All of the attachments are interchangeable without removing or disturbing the mechanism of the machine proper. A special clearance reducing arrangement makes it possible to ship the machine from place to place without dismantling. The collapsible mast and special shipping treads which may be substituted for the working treads, bring the machine within railroad clearance requirements of 10 feet 4 inches overall width and 16 feet overall height above top of rail when loaded on flat car.

Among the features of the new machine are: The one piece annealed cast steel finished lower frame; totally enclosed machine cut driving gears and steering mechanism; one piece automobile type drive axle housing and full floating drive axles; one piece cast steel annealed finished rotating base; 13½ inch diameter center pin; internal expanding friction clutches, main drum 42 inch and swing and travel clutches 30 inch diameter; drum brakes 48 inch diameter by 5 inches wide; and drums with renewable cast steel cable shells and with air space between clutch and brake surfaces for cooling.

The machine in working condition is 12 feet wide overall at the lower frame and the crawler treads are 36 inches wide. It is built to be driven with gasoline engine, electric motor or Diesel engine drive.



A Two Yard Capacity Crawler Crane

Magnetic Opens Factory Sales in Chicago

The Magnetic Manufacturing Company of Milwaukee has announced a discontinuance of the former sales office in Chicago. Instead of this, a direct factory branch office has been opened at 211 North Desplaines Street in Chicago from which all Magnetic business will be handled.

New Drifter Drills

Ingersoll-Rand of New York City has recently announced a new line of drifter drills of three sizes and of the same general construction. Simplicity of construction, greater drilling speed, higher efficiencies and easier handling are some of the features claimed.

The largest of these drills, the S-70, weighs 185 pounds and is recommended for heavy duty in hard rock and for deep holes. It is especially suitable for tunneling and crushed stone quarries.

The 138 pound, N-75 is said to fulfill the needs of general work and has the speed and power of some machines from 20 to 40 pounds heavier. The L-74 was designed as a one man drill and weighs only 110 pounds. It is recommended for medium soft ground and for close quarter working. These drills are comprehensively described and illustrated in a 4 page bulletin which is being distributed to the trade.

Anderson Issues Bulletin

In a 20 page illustrated bulletin 35, the Anderson Engine and Foundry Company, Anderson, Indiana, features pages of advertising which have recently appeared in different industrial magazines. The entire bulletin is composed of reproductions of these magazine pages which call particular attention to the different publications of the company, especially catalog 34. The bulletin is interesting because of illustrations of the Anderson Diesels in actual operation at different plants and over various periods together with additions which have been made to different plants.

Morrow Consolidates Offices

The Morrow Manufacturing Company of Wellston, Ohio, announces that the branch office at Columbus, Ohio, has been consolidated with the main office. All inquiries should be addressed to the main office at Wellston, Ohio.

Dust Arrestor Discussed

The New Haven Sand Blast Company, New Haven, Connecticut, is distributing an 8-page illustrated bulletin which describes a flat bag dust arrestor of two types. Type A is for small inside installations and type B of the larger size but both types are made on the same general plan. Standard units are used in the construction of the baghouse, inlet expansion chamber and hoppers to provide for increasing the size of the arrestor by adding sections.

The arrestor consists of a rectangular, air tight bag house which is built of standard 16 gauge, galvanized steel reinforced panels. It is supported on channels and angle iron supports and is located over an inlet expansion chamber which has hopper bottoms. The baghouse is separated from the expansion chamber by a steel partition with a series of steel channels, spaced to permit the passage of air from the expansion chamber to the baghouse. Spaces in channels are covered with bags which filter the air as it is drawn by suction from the expansion chamber to the baghouse. These bags are seamed vertically to hold their flat shape and are closed at the end so they are supported by a rod inserted in the hem. Adjustment of tension on the bags is governed by the eye end of a turn buckle which carries the end of the rod on a hooked end. All turn buckles, thumbscrews and attachments are cadmium plated to prevent rust and are easily removed without tools. The inlet pipe may enter the expansion chamber at any side and the exhaust connection from the baghouse to the fan, may be made at the upper end of the inside panel.

The manufacturer claims a number of advantages for this arrestor, among which is the large cloth area in a limited space; this type of bag enables shaking both vertically and horizontally; and it is designed for a double separation of dust. It is said to combine the advantages of a classifier, a screen type arrestor and a cylindrical bag filter in one unit.

Cameron Pumps Described

The A. S. Cameron Steam Pump Works of the Ingersoll-Rand Company, New York City, recently published a 30 page illustrated catalog describing the Cameron multi-stage centrifugal pumps for high pressure boiler feeding, mine drainage and pipe lines.

These pumps are built in stages from 2 to 6 in a single casing and up to 12 stages in series and are of the horizontal, split case, single suction, combination turbine and volute type. Capacities range from 125 to 3000 gallons per minute, and pressures up to and over 1500 pounds.

The casing is of cast iron and is made in two parts, being divided along the horizontal center line. The upper half is readily removable and gives full access to the revolving element. Channel rings are made of cast iron, shafts of forged steel, and the bronze impellers are of the enclosed type and are each cast in one piece.

Thrust is taken care of by a flanged hydraulic drum and sleeve, the drum being keyed and locked on the shaft, revolving with the rotor in the stationary sleeve. A Kingsbury thrust bearing incorporated with the outboard main bearing maintains alignment of the rotor.

A stationary bronze diffusion ring completely surrounds the impeller and is held by two lugs. A split-bushing spherical fitting bearing is located at each end of the casing, maintaining the alignment of the shaft. A flexible coupling is provided to take care of end play or floating. The stuffing boxes are low pressure, being subjected to suction pressures only.

Kimball Deep Well Pumps

The Kimball Pump Company, Incorporated, of Los Angeles, California, is distributing two bulletins; Number CT-108 describing the centrifugal turbine type deep well pump, and DF-109, the direct flow turbine type.

Features of the centrifugal pump are, six foot column lengths, shafts six feet long, with a shaft tube coupling, and bearing each six feet; corrosion and sand-proof bearings on shaft; easy adaptability to all types of drives; hollow drive shaft and enclosed line shaft.

The direct flow pump also has six foot column lengths but differs in having an impeller at each end of every section, and in the 3 inch clearance all around the impeller shaft. Sizes range from the 5DF for a 5 inch diameter well with a capacity of 100 to 300 gallons per minute, to the 22DF—22 inch pump with a capacity of 6,000 to 12,000 g. p. m.

Vulcan's Latest Line

The latest additions to the Vulcan locomotive line are electric storage locomotives and electric trolley locomotives which are described in a 12 page illustrated bulletin. The illustrations show the cross equalizer, the operators seat, cam brake, sand boxes, side frames, brakes, wheels and axles, battery box, springs, trolleys, and worm drive.

Ambler Corrugated Asbestos Sheathing Discussed

The Asbestos Shingle, Slate and Sheathing Company of Ambler, Pennsylvania, in a booklet recently published, describes the Ambler asbestos corrugated sheathing, for which it is claimed that it is non-rusting, indestructible, and never requires paint.

This sheathing can be used for roofing, siding, awnings, elevators, rolling mills, train sheds, warehouses, and anywhere fire protection is desired. It is 5/16 inches thick with 2½ inch corrugations, 27½ inches wide and is made in lengths of from 3 to 10 feet. Another size is made 42 inches wide, 11/32 inches thick, with 2⅝ inch corrugations, in lengths of 4, 5, 6, 7, 8 and 8½ feet, and weighs 3¾ pounds per square foot.

Like asbestos "Century" shingles the sheathing is composed of 15 per cent asbestos fibre and 85 per cent hydraulic or portland cement. This mixture is combined with a sufficient amount of water to bring the cement to a colloid state and is then subjected to a pressure of 650 tons to the square foot.

The product is light in weight, weighing about 2.8 pounds per square foot, and its hard dense texture makes it waterproof as well as fireproof. Like concrete, its strength is said to increase with age.

Many illustrations of this sheathing in actual use are included in the booklet as well as methods and tables for applying, flashing, etc. Asbestos building lumber, shingles, and "Linabestos" wallboard are also described.

A. J. Forschner Joins Atlas Conveyor

A. J. Forschner, formerly sales manager of the sand, gravel and stone department of the R. H. Beaumont Company, and previously president of the Alfred J. Forschner Company, has become associated with the Atlas Conveyor Company of Philadelphia as vice president.

The Atlas Conveyor Company is extending activities to include the building of drag scrapers for excavating sand and gravel, and for the storage of bulk materials, such as sand, gravel, coal and crushed stone.

Evolution of a Controller

The Electric Controller and Manufacturing Company, Cleveland, Ohio, is distributing a 4 page illustrated bulletin which describes the Dinkey controller. It is the evolution of the controller invented by A. C. Dinkey in 1896. The bulletin features the controller that was exhibited at the Iron and Steel Exposition in Chicago.

An Interchangeable Excavator

The Insley Manufacturing Company of Indianapolis announces a new full revolving excavator known as type "R." It is made with five attachments, the shovel, ditcher, skimmer, crane and dragline, all of which are interchangeable. It is said to have many features of advanced design, including roller bearings for all shafts above the revolving frame, cut gears throughout, cast steel car body, cast steel machinery base and side frames, separate control for each crawler, and one shot lubrication for crawler rollers. A special feature is the use of hydraulic brakes which operate separately on each crawler, and are controlled from the platform. Another feature is the swinging which is 5 r. p. m., which combined with the line speed gives an exceptional operating speed.

It uses the Insley patented cable crowd. The standard shovel boom is 17 feet 6 inches long, giving a dumping clearance of 12 feet 6 inches, or the shovel can be equipped with a high lift boom and dipper for any clearance up to 15 or 16 feet. It has a gear driven power boom hoist which is self locking without the use of brakes or dogs. The ditcher uses the same boom as the shovel, and has an effective digging depth of 18 feet. The skimmer has a digging radius of 20 feet 6 inches from the center of rotation, a dumping clearance of 10 feet and carries a bucket with one-half yard working capacity. The crane has a 35 foot boom as standard equipment, and can be equipped with a longer boom if necessary. Its capacity is 5200 pounds at 18 foot radius, 4500 pounds at 20 foot radius and 2500 pounds at 30 feet. It has more than ample capacity to handle a one-half yard clamshell. The dragline uses the same boom as the crane and a bucket with a half yard working capacity.

New Zelnicker Bulletin

The Walter A. Zelnicker Supply Company of St. Louis, Missouri, is distributing Bulletin 367 listing new and used steel piling, steel pile hammers, pipe bars, beams, rails, oil engines, boilers, pumps, locomotive cranes, gas engines, and locomotives.

Stephens Adamson Reversible Electric Winches

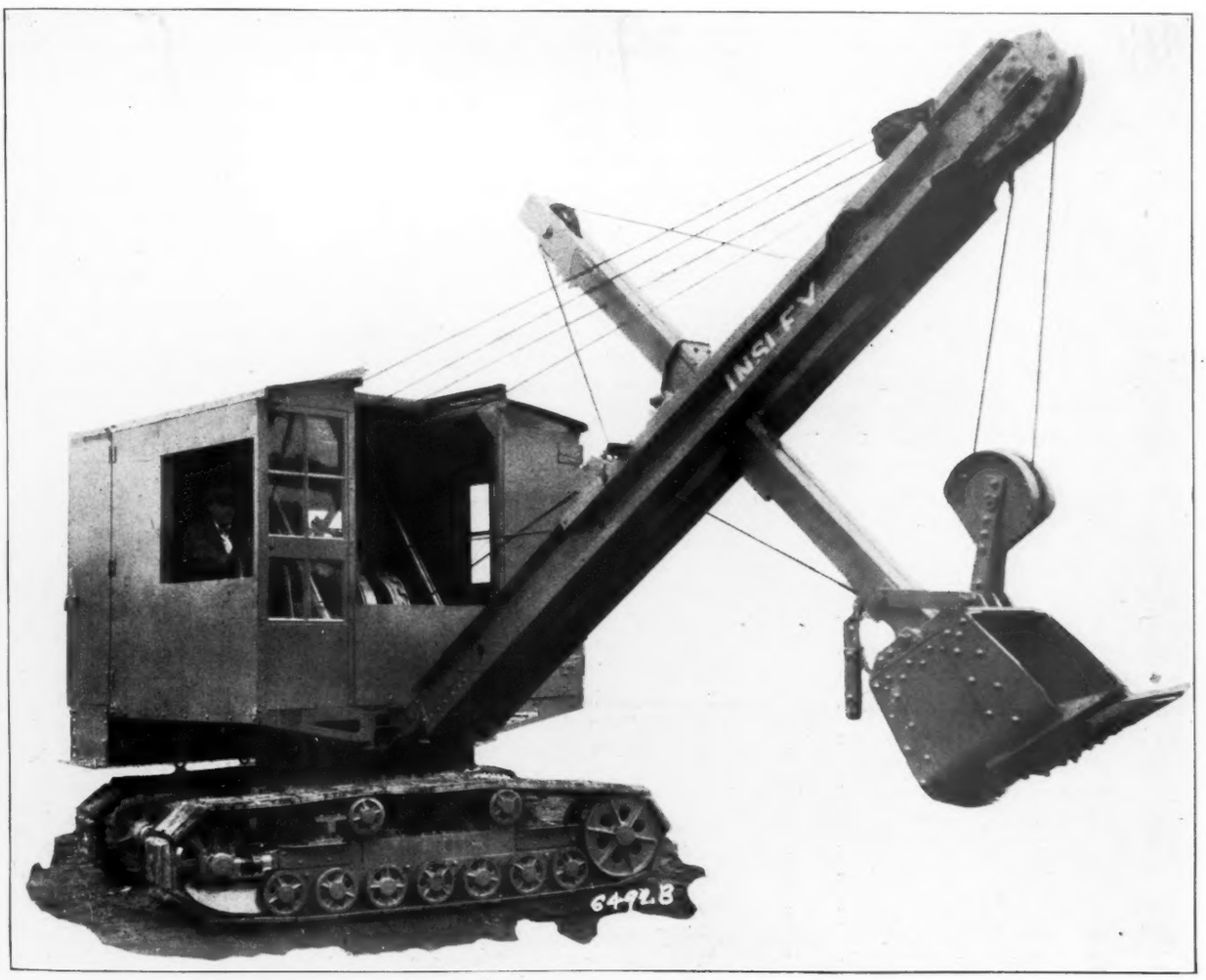
The Stephens - Adamson Manufacturing Company of Aurora, Illinois, is making two types of reversible motor driven winches. These types supplement the hand power winches which have been manufactured for years.

Style "WK" is for wall mounting and "K" for floor or pedestal. They are furnished with 1, 1½ or 2 horse power reversible electric motors and are rated to pull 700, 1100 and 1400 pounds respectively at a rope speed of 25 feet per minute. All gears are cut and operate in oil and the worm has ball thrust bearings.

New Chisholm Moore Hoist

The Chisholm Moore Hoist Corporation of Cleveland, Ohio, is distributing a catalog insert section describing the new "Blue Boy" and other hoists.

The "Blue Boy" is a direct differential hoist with malleable iron yokes and a drop forged hook, and is equipped with Hercules Inswell electric welded load chain.



A Full Revolving Interchangeable Excavator

Kilns, Coolers and Dryers Discussed By Vulcan

The Vulcan Iron Works, Wilkes-Barre, Pennsylvania, is distributing a 28-page bulletin which describes the line of Vulcan kilns, coolers and dryers together with small sections devoted to clinker scales, locomotives, hoists and grinding mills.

The shell for the kiln for Portland cement is made of open hearth steel plate with sheets squared and edges planed. It is of sufficient strength to support the required load. Tires are of box shape, made of open hearth cast steel and thoroughly reinforced. Each tire is supported on a set of roller bearings which may be of the equalizing cradle or self lubricating type. The thrust bearing consists of two cast steel rollers and steel shafts, vertical bronze bearings and a central frame. The gear ring is either T shaped, bolted to a supporting flange or the D box section, which is connected to the shell by means of bands or plates. The driving gear is usually of four reduction with a ratio varying from 100 to 220 to 1, depending on the size of the kiln. The latest design is set low on its foundation with a continuous rigid cast iron box bedplate. All pinions are made of open hearth cast steel. Firing hoods are all made of sheet steel plate over an angle iron frame and are mounted on either cast iron or structural steel side brackets with four wheels and side turned shafts. Kiln stacks of ample diameter and height are made of sheet steel plate with top and bottom reinforcing bands on the outside and sectional guy rod bands. Rotary lime kilns are similar to those for the manufacture of Portland cement, excepting the rotary lime kilns are not so large as the largest sizes of cement kilns.

The shell of the rotary cooler is made of open hearth steel and the interior may be equipped in a number of different ways for facilitating cooling. It is carried on tires made of open hearth steel and two sets of roller bearings are furnished. The discharge end is equipped with one set of thrust roller bearings, consisting of two bronze bushed cast steel rollers and vertical shafts mounted at the ends of a cast iron central frame. It is revolved by a gear ring which is riveted to the shell near the lower tire. The rotary dryer specifications are the same as for the cooler, except the cast iron plates are omitted and tumblers run all the way through in most cases.

Carl F. Weiblen Appointed Williams Chicago Manager

Carl F. Weiblen, formerly Cleveland manager and previous to that a member of the Erie, Pennsylvania office, has been appointed Chicago manager for the G. H. Williams Company, makers of Williams buckets.

Mr. Weiblen takes the place of R. B. Randall, who is taking the position of Pacific Coast manager for the Link Belt Company with headquarters in San Francisco.

Westinghouse Promotes Goodwin

W. C. Goodwin, formerly section engineer of the control engineering department, has been appointed manager of the renewal parts department of the Westinghouse Electric and Manufacturing Company. Following his graduation from Pennsylvania State College and on completing a graduate student course of the company Mr. Goodwin served as section engineer on apparatus development, which position he retained until his present position.

E. H. Gerberding has been made assistant treasurer of the Westinghouse Electric and Manufacturing Company. Mr. Gerberding started in the treasury department 28 years ago and has been in continuous service since that time.

Lubricating Oil Advice

Under the caption, "Lubrication for Safety and Economy," E. F. Houghton and Company, of Philadelphia, are distributing an 18-page illustrated booklet. The pages of the booklet are mostly devoted to a description of the Gun-Fil lubricator which is recommended with the use of Houghton's absorbed oil.

Street Slackline Excavators And Hoists Described

The Street Brothers Machine Works of Chattanooga, Tennessee, is distributing Bulletin Number 58 describing the Street slackline excavators and hoists. Complete descriptions of these products are given, as well as illustrations showing them in actual use, and tables giving the capacities of the different types under varied conditions.

The slackline excavators are made to handle buckets of ½, ¾, 1, 1½, 2, 2½, and 3 yard capacities and are primarily designed to give maximum efficiency on "long range" work, from 200 to 1200 feet or more. They are particularly recommended by the manufacturer for work under the following conditions: Where material must be dug at a great depth; where operations must be carried on far below the surface or under water; where materials must be dug and conveyed a considerable distance; where materials must be dug, conveyed, elevated and dumped into hopper, car or on spoil pile; and where operations extend over rough territory or obstruction filled areas.

The Street steel mast features an extra heavy cap fastened to the top by a gudgeon pin that extends down through the mast, and the ball and socket base, consisting of a heavy steel casting riveted to the mast base and fitted over a steel ball casting bolted to the mast foundation, allowing the mast to rotate.

Three main guys are furnished, all of the same size and strength as the track cable, allowing the bridle to be shifted over a large area without moving the tower guys. Slings are furnished for both guys and bridle and Crosby clips are standard equipment.

The sheaves are cast steel of large diameter and are standard equipped with Moccasin oil distributing bushings. A feature of the blocks is the anti-fouling band designed to eliminate fouling of the lines. The carriage is attached in such a way that it cannot fall into the bucket during the digging operation. The carriage sheaves are cast steel, pressed and keyed to the shaft which is journalled on each side of the carriage, and the journals are bronze bushed.

The buckets are a back dump type with the pull in front of the digging blade and are made of boiler plate, securely riveted and braced. Cutting lips are of alloy steel and the carriage fastens to the bucket by a swivel connection on the bail.

The two speed slackline hoists are specially designed for this work and are made to operate by electric, gasoline or steam power. The frames are heavy I beams with the upper flange reinforced and planed to form a seat for the drum housings. Drums are made in three pieces, the barrel and two flanges, eliminating shrinkage strains.

The tensioning drum and low speed friction are driven by outside band frictions and the high speed is of the disc clutch type to assure smoothness in acceleration. Gears are of steel and pinions of forged steel with machine cut teeth.

Equipment Corporation Again Expands

The Equipment Corporation of America has purchased from the Allis Chalmers Company the industrial property, 200 by 600 feet, at Washtenaw Ave. and Roosevelt Road, Chicago. The present buildings on the site will be remodeled and reequipped in order to accommodate an increase in the volume of business.

The Equipment Corporation is the largest concern of its kind devoted to rebuilding contractors', quarry and other construction equipment. It is now celebrating its 25th successful year and with the facilities provided by the new acquisition the officials of the Company expect much further developments. The Rebuilding Department of the Company was established in Chicago ten years ago. During this period it experienced three distinctive expansions.

In addition to the new Chicago plant the concern has branches in Pittsburgh, Philadelphia and Chicago Heights. The Chicago Heights plant is devoted solely to the manufacture of new equipment. Their Philadelphia plant is the largest of its kind in the East, covering 8½ acres with 71,000 sq. ft. of floor space all under roof. All plants have private railroad switch tracks and sidings.

They have supplied equipment to the largest contractors in the United States and also make quite a number of export shipments each year. Their customers are varied, they supplying not only the general contractor and quarry men but public utilities and a number of the largest railroads. They are the pioneers in guaranteeing rebuilt equipment, and their guarantee is broad and very fair.

They not only sell rebuilt equipment, but rent it, and can equip a job of any size no matter how small or how large.

Believing that no business has a right to exist that does not perform a service, the Equipment Corporation offers three distinct services: Firstly, a complete line of equipment immediately available, strategically located; secondly, expert advice in the selection of the right equipment for the specific job; thirdly, a market for the contractors surplus equipment.

They are careful not to handle obsolete equipment of any kind and this is one factor which has contributed to their success. The company uses great foresight in studying large construction projects so as to be prepared with just the class of machinery which will be required for the work, and they can usually furnish the equipment for these projects immediately from their stock.

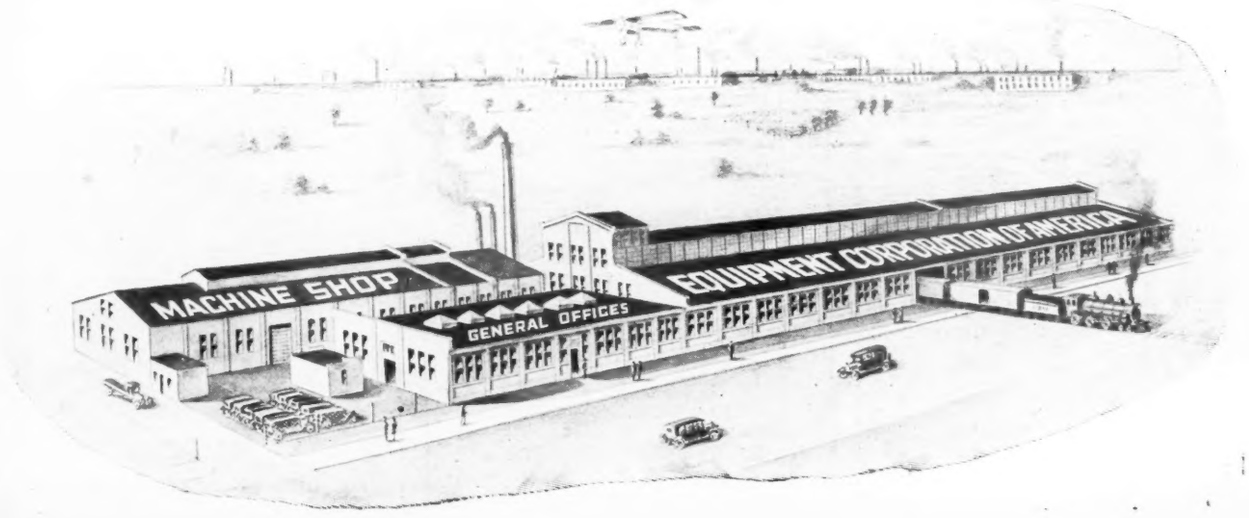
H. M. Capron, President of the Corporation, expresses an optimistic opinion of the future. "Prosperous conditions evident in the country as a whole," he said, "combined with the wonderful building and highway activity is lending great impetus to the construction field. Municipal and government improvements are being effected as rapidly as plans can be completed, some of the railroads are at present launching terminal improvements involving millions of dollars. These factors are significant and conducive to optimistic contemplation of the future of American business as a whole and the construction equipment line will enjoy a fair volume of business. As one of the largest concerns in the reclaiming of machinery, they keep close watch on the development of American industry and endeavor to anticipate the needs in our industry."

This is one of the many reasons for the acquiring of the new Chicago plant, which is strategically located right in the center of the City of Chicago and is within 2½ miles of the Loop district.

Vulcan Gasoline Locomotives With 3 Point Suspension

The Vulcan Iron Works, Wilkes-Barre, Pennsylvania, is distributing a 24 page illustrated bulletin, 101-R, which discusses Vulcan gasoline locomotives of four speeds and worm gear drive. It is claimed that these locomotives are built to conform to the four most important fundamentals of transportation: Power is obtained from the engine at the most economical speed as related to fuel economy, long life and absence of vibration; dependability is based on approved details, recommended standards of the Society of Automotive Engineers and on 50 years haulage experience; and economy where dependability is embodied in the moving parts which will give the greatest service with minimum maintenance cost. It also gives graphs of the working parts and a view showing their accessibility together with letters from operators using this make of gasoline locomotive.

Accompanying this bulletin is a 4 page supplement, or bulletin 103, which features the 3 point suspension used on locomotives of 8 to 40 tons. This is not new as it has been applied to steam locomotives for many years and Vulcan has applied it to gasoline locomotives of the larger sizes. It consists of four semi-elliptic springs made of crucible cast spring steel, oil tempered and flexible. The middle of the spring rests on the saddle over each driving box and steel hangers which straddle and support the frame on each side are suspended from the ends of the rear springs. The front springs carry the weight of the locomotive through a set of hangers on one end a cross equalizing beam on the other. This beam is supported in the center on an equalizing beam support by means of steel pins. In this manner a 3 point suspension of the chassis is obtained.



Rates for display advertisements in the Broadcast Section are given below. If you want to buy or sell used equipment, if you want a job or need a man, advertise your wants in Pit and Quarry. Advertisement copy for publication in the next issue should reach our office within one week after the date of this issue.

RATES PER INSERTION	1 Inch	2 Inches	3 Inches	4 Inches	5 Inches	6 Inches	8 Inches	9 Inches	10 Inches	12 Inches	15 Inches	20 Inches	30 Inches
1 Insertion	$ 3.75	$ 7.25	$10.75	$14.25	$17.75	$ 21.25	$28.25	$31.75	$35.25	$42.25	$56.25	$70.25	$105.00
2 Insertions	3.75	7.25	10.70	14.20	17.65	21.15	28.15	31.65	35.15	42.15	56.15	70.00	104.00
3 Insertions	3.75	7.20	10.65	14.15	17.55	21.05	28.05	31.55	35.10	42.05	56.05	69.75	103.00
4 Insertions	3.70	7.15	10.60	14.10	17.45	20.95	27.95	31.45	35.00	41.95	55.90	68.75	101.00
8 Insertions	3.65	7.05	10.50	14.00	17.25	20.75	27.75	31.25	34.80	41.75	55.70	67.50	98.00
13 Insertions	3.60	6.95	10.40	13.90	17.05	20.55	27.55	31.05	34.60	41.55	55.55	66.25	94.00
26 Insertions	3.50	6.75	10.20	13.70	16.65	20.05	27.05	30.65	34.20	41.05	55.05	64.00	88.00

INFORMATION—"Broadcast" space is sold by the advertising "inch." Each page contains 30 inches. The width of the page is divided into 3 columns, each 2¼ inches wide. Each column contains 10 inches measured the length of the column. Any space may be used measured by the *even* inch in height (not fractions), by 1, 2 or 3 columns in width. The size of a space is its height in inches multiplied by the number of columns in width. Example: a space 3 inches high by 2 columns wide is 6 inches. Copy changes made without additional charge.

It Pays to Advertise in PIT and QUARRY

"We are pleased to advise that we obtained very good results and consequently have sold the bucket. We had inquiries within a very few days after our ad was published."—Northern Indiana Sand and Gravel Co.

Complete Service Publishing Company

538 South Clark Street **CHICAGO**

Machinery for Sale

SPECIALS
1—4½'x16" Hardinge Steel Lined Mill
1—No. 6 Williams Universal Hammer Mill

CRUSHERS

Crushing Rolls

1—8"x5", 2—14"x20", 4—24"x12", 1—26"x15", 1—30"x10", 1—30"x16", 2—36"x16", 2—42"x16", 1—54"x24".

Gyratory

All sizes from No. 2 Reduction to No. 12K.

Jaw

One 4"x8"—two 7"x10"—one 6"x20"—two 9"x15"—one 10"x20"—two 12"x24"—one 18"x36"—one 24"x36"—one 42"x30".

Rotary

Two No. 0, two No. 1, one No. 1½, and one No. 2 Sturtevant Rotary Fine Crushers.

Ring Roll

One No. 1 and one No. 2 Duplex Sturtevant ring roll mills.

Ball and Tube Mills

3', 4', 4½', 5', 5½', 6', 8' Hardinge Mills and Tube Mills.

DRYERS

One 3'x30', Three 4'x30', One 4½'x30', One 5'x40', One 5½'x40', One 6'x60', One 7'x60' and One 8'x80' Direct Heat Rotary Dryers, One 5'x25', One 6'x30', Two 8'x80' Ruggles Coles type "A" and One 4'x20' Ruggles Coles type "B" Double Shell Rotary Dryers.

KILNS

4'x40', 5'x60', 6'x60', 6'x70', 6'x90', 6'x100', 6'x120', 7'x80', 8'x125'.

MILLS

Two 33" and two 42" Fuller Lehigh Mills.
1 No. 0000, 1 No. 00, 2 No. 1, 2—4 Roll, and 1—5 Roll Raymond.
Swing Hammer Mills, Griffin Mills, Attrition and Cage Mills.
Air separators, Screens, Elevators and Conveyors.

The Heineken Engineering Corp.
Industrial Engineers
117 Liberty St., New York City
Courtlandt 5130

FOR SALE

CRUSHERS—GYRATORY

No. 7½ KENNEDY
No. 7½ McCULLY
No. 6 McCULLY
No. 6 KENNEDY
No. 9-K ALLIS CHALMERS

ROTARY KILNS

2—8'x125'
1—9'x100'
1—7'x100'
1—6'x 70'
1—7-5½x60'

EQUIPMENT SALES COMPANY
R. W. Storrs, Jr., Manager
Richmond, Virginia

CENTRIFUGAL PUMPS

10—Allis-Chalmers 10-in. suction and discharge Direct connected to 200 H.P. 3 phase, 60 cycle, 2200 Volt Motor, capacity 3500 G.P.M. at 180 ft. head.
12-inch Morris Steam Drive.

DREDGE PUMPS

2—Morris 8-inch Steam Drive.

DRAGLINES

Class 24 Bucyrus Electric.
Class 14 Bucyrus Steam.

DUMP CARS

8—K. & J. 4 yd. 36-inch gauge.
4—Western 6 yd. standard gauge.
10—Koppel 1½ yd. 24 inch gauge.

GASOLINE LOCOMOTIVES

2—Plymouth 4 ton 24 inch gauge.

STONE SCREEN

Heavy Duty 3 ft. by 12 ft. Roller Type A.C. Motor Drive.

THE U. G. I. CONTRACTING COMPANY
Attention: Mr. R. C. Stanhope, Jr.
Supervisor of Equipment,
U. G. I. Building **Philadelphia, Penna.**

CRAWLER SHOVELS

1—MARION MODEL 37, Steam, Crawler, New 1927, 1¾ yd. Mang. Dipper, Boom 26 ft., Dipper handle 17½ ft. Overhauled. Like New.
1—ERIE B-2 DREADNAUGHT, Steam, Crawler; New 1927, 1-yd., HIGH LIFT, Overhauled. Excellent Condition.
1—KOEHRING, GASOLINE, New late 1926, 1-yd. HIGH LIFT, Overhauled, First-class condition.
1—OSGOOD HEAVY DUTY (1-yd.), GASOLINE, New 1927, HIGH LIFT. Also 40 ft. Crane Boom if desired, Excellent condition.

CRANES

1—12-ton cap. NORTHWEST, Model No. 105, GASOLINE, Crawler Crane, New late 1926, 40 ft. Boom, Bucket Operating, Steel Cab, First-class condition.
2—25-ton, 8-wheel, INDUSTRIAL, Type G, Steam locomotive Cranes, New 1926, 50 ft. Booms, Bucket Operating, M. C. B., Excellent condition.

GREY STEEL PRODUCTS CO.
111 Broadway **New York, N. Y.**

FOR SALE OR RENT

GAS SHOVEL

1—10-ton McMyler Gas, rebuilt.

GASOLINE SHOVELS AND CRANES

1—Link-Belt Comb. Gas-Crawler, 1-yd. Shovel and 15-ton, 50 foot boom Crane. Like new.
1—Northwest, Model 105, 50' Boom. 2-yrs. old.

GASOLINE LOCOMOTIVES

2—7-ton Plymouth, 36" Gauge. Like new.
1—8-ton Plymouth, 36" Gauge. Like new.
1—12-ton Whitcomb sta. ga. Like new.

HOISTING ENGINES

1—40 HP. Mundy, DD, 2-ph., 60-cyc., 220-v.
1-22 HP. Lambert, DD, 2-ph., 60-cyc., 220-v.
1—7x10 Lidgerwood, DC, DD, Boiler mounted with Swinger attached.
1—60 HP. National 3 drum 3 phase, 60-cyc., 220-v., with motor driven independent swinger.

BOILERS

1—125 HP. Locomotive Type, ASME, 125 lbs. Pressure.

DUMP CARS

8—4-yard Western 36" gauge cars, steel beam and steel floors. Like new.

B. M. WEISS
1324 Widener Bldg., Philadelphia, Pa.